Google Walk

One step closer to a healthier life
Meet **Google Walk**

The quickest way is rarely the best way – *Google Walk is an Navigation app that brings a healthier lifestyle by helping you to walk a little bit more*

- Designed for walkers who wants to have walking habit
- Takes account walker’s safety concerns
- Fits walking into people’s everyday life
- Show walkers more enjoyable routes to explore
- Simplify way finding
Onboarding with Google Walk

#Minimal

#Well Timed

#Building your own story
Our core Features
Use Case # Safe

Go back home from school at night time

I want to stay safe

I have no idea what is ahead.

Don't worry. I get your back. I will offer you safer routes with:

- Better lighting
- More open stores
- Less crime record
Use Case # Safe
Use Case #Active

Meet fitness goal through daily commute

I need to reach my destination on time.

I want to make progress whenever I can.

It’s a hassle to arrange time for exercise.

Got it! Let me take care of it. I will offer you routes for commute that:

- Get you to destination on time
- Reduce time wasted on waiting
- Help you make progress on fitness
Use Case **Active**

Set up your daily goal

- 10000 steps

For more accurate daily walking goal estimation, connect to your fitness services.

We will be minimizing idle time to maximize activeness.

Fastest route

42 min

27% to goal

320 Calories

Leaves in 10 min

Arrives at in 10:05

Their route:

Leave in 10 min

Arrive at in 10:05

32 min

32% to goal

37% 18 min

32% 10 min
Use Case **# Scenic**

Enjoy the scenery when taking a stroll

It’s boring to take the same route every time.

A quiet place with greenery in the great would help me relieve stress and have a better mood!

No problem. I am here to help. I will offer you an enjoyable walk with:

- More trees and green
- Far away from traffic and noise
- Interesting places to explore
Use Case # Scenic
Use Case # Explore
Exploring your interests on foot

I have some free time but I don’t know where to go.

Doing research on attractions is tiring. I would give up on places that are hard to reach.

Just a second. I will figure it out. Check out these routes to explore:
- Cover attractions of personal interest
- Within walking distance
Use Case # Explore
Use Case #Landmark Navigation

Make wayfinding crystal clear

Map is **hard to read or relate** to the real world.

Even if I **keep checking my phone** to stay on track, **network delay and jitter** can lead me to a wrong path.

I understand. Here's our solution.

With **landmark navigation**, you are provided:

- An overview of route before setting off
- Digestible chunks of trip to track progress
- Intelligible instructions to set you free from the screen
“Go straight, once you pass Starbucks, turn right.”
Let’s go behind the Scenes
Why AI is a good fit for our user needs?

**Route Suggestion**

<table>
<thead>
<tr>
<th>User Needs</th>
<th>Safety</th>
<th>Pleasure</th>
<th>Reduce Idle Time</th>
</tr>
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<tbody>
<tr>
<td>Risk reduction</td>
<td>Access to help</td>
<td>Adequate light</td>
<td>Attractions and interests</td>
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<tr>
<td>Better scenery and environment</td>
<td>Motivation of fitness</td>
<td>Fit walking in the time frame</td>
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**Navigation**

<table>
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<th>Ease of Navigation</th>
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<td>A more intuitive way to navigate</td>
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**AI's Capabilities**

- Improving journey experience by considering variables related to safety, pleasure, and efficiency.
- Generating routes based on location, time, and user preferences.

**Features**

- Safe Mode
- Scenic Mode
- Explore
- Active Mode
- Landmark Navigation

Selecting landmarks based on location, time, and user habits.

Showing dynamic instructions on wayfinding.
Why AI is a good fit for our user needs?

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#### Features

- **Safe Mode**
- **Scenic Mode**
- **Explore**
- **Active Mode**

#### Navigation

- **Ease of Navigation**
  - A more intuitive way to navigate

- **Landmark Navigation**
  - Selecting landmarks based on location, time and user habits.
  - Showing dynamic instructions on wayfinding.
Why AI is a good fit for our user needs?

Overall, we use AI to

1. Deploy real-time data
2. Evaluate all possible options against a set of factors
3. Customize recommendations/instructions for different users
4. Iterate and develop upon user data to increase efficiency and accuracy
Overall, we use AI to automate data collection and analysis tasks for all the variations, provide user multiple best routes regarding various criteria. Automation enables users to enhance efficiency and accuracy in route planning, including:

**Automation**

Pick the routes that are more safe by:
- Analyzing safety incident case # happened nearby
- Analyzing how well-lit the route is through public open source data

Pick the routes that are more enjoyable by:
- Analyzing the noise level by calculating real time traffic flow
- Analyzing which routes are more scenic

Picking the appropriate landmarks that are easy to identify and relate to by:
- Pick the landmarks that are larger & easy to identify at the time of day
- Pick the landmarks that the walker visited more;

Help walkers to fit fitness goals into their daily life by:
- Tracking real-time commute options to accommodate user’s fitness goals while saving time
Data & ML Model

Professional raters for model building/ training
Raters recruited from Amazon SageMaker Platform

Datasets
Sample Routes
Sample Landmarks

Features
Safe
Scenic
Navigation

Labels
Safety Level
Enjoyment Level
Ease level to recognize landmarks

Output
Route Suggestions with safety and scenery concerns + proper navigation landmarks

User Feedback for Fine-tuning

Stages
Implicit Feedback
Explicit Feedback

Destination Select
Time + Destination

Mode select
Time + Mode Selected

Route Select
Route rejected / Selected

Navigation
Patterns of route track/instruction skip
Stop route reason survey

Journey End
Feedback survey skip
Binary Survey
Dissatisfaction survey

Output
Improved ML for Accuracy and Personalized Experience
Data & ML Model

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- Sample Routes
- Sample Landmarks

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- Scenic
- Navigation

**Labels**
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**Output**
Route Suggestions with safety and scenery concerns + proper navigation landmarks

**User Feedback for Fine-tuning**

**Stages**
- Implicit Feedback
- Explicit Feedback
- Time + Destination
- Time + Mode Selected
- Route rejected / Selected
- Patterns of route track/instruction skip
- Stop route reason survey
- Feedback survey skip
- Binary Survey
- Dissatisfaction survey

**Output**
Improved ML for Accuracy and Personalized Experience
**ML output:**
Safe Mode Route suggestion

**ML system trying to learn:**
Evaluate how safe a route is

**Raters:**
US Residents; at least 60% Females; Diverse Age Groups; Diverse Culture Groups.

**Source of the data:**
50,000 routes from Google Map, City Crime and Street Light Outage Database.

### FEATURES

<table>
<thead>
<tr>
<th>Route ID</th>
<th>Google Map Street View</th>
<th>Time of the day</th>
<th># of open shops along the route</th>
<th># Crime case along the route from last 90 days</th>
<th># of streetlight all out</th>
<th>Walking duration</th>
<th>Sense of safety</th>
</tr>
</thead>
<tbody>
<tr>
<td>A1AU3</td>
<td>![Street View]</td>
<td>21:00</td>
<td>14</td>
<td>6</td>
<td>5</td>
<td>25 m 13s</td>
<td>High</td>
</tr>
<tr>
<td>XUQ2D</td>
<td>![Street View]</td>
<td>19:00</td>
<td>9</td>
<td>4</td>
<td>10</td>
<td>20 m 23s</td>
<td>Medium</td>
</tr>
<tr>
<td>IUY2I</td>
<td>![Street View]</td>
<td>20:00</td>
<td>2</td>
<td>5</td>
<td>10</td>
<td>15 m 11 s</td>
<td>Low</td>
</tr>
<tr>
<td>O1Y3P</td>
<td>![Street View]</td>
<td>23:00</td>
<td>4</td>
<td>7</td>
<td>3</td>
<td>20 m 10s</td>
<td>Low</td>
</tr>
</tbody>
</table>
**ML output:**
Scenic mode route suggestion

**ML system trying to learn:**
How enjoyable a route is

**Raters:**
US Residents; Diverse Culture groups, Fitness level (good, average, below average)

**Source of the data:**
50,000 routes from Google Map.

<table>
<thead>
<tr>
<th>EXAMPLES</th>
<th>FEATURES</th>
<th>LABELS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Route ID</td>
<td>Location</td>
<td>Street View</td>
</tr>
<tr>
<td>A1AU3</td>
<td>Magnificent Mile</td>
<td>![Image of Magnificent Mile]</td>
</tr>
<tr>
<td>XUQ2D</td>
<td>Chinatown</td>
<td>![Image of Chinatown]</td>
</tr>
<tr>
<td>IUY2I</td>
<td>South Loop</td>
<td>![Image of South Loop]</td>
</tr>
<tr>
<td>O1Y3P</td>
<td>Millennium Park</td>
<td>![Image of Millennium Park]</td>
</tr>
</tbody>
</table>
ML output: Landmarks for navigation in route suggestion

**ML system trying to learn:**
Which landmarks are easy to recognize

**Raters:**
US Residents; Diverse Gender and Culture Groups; People with Different Visual Ability Levels (near sighted, far sighted, color deficiency);

**Source of the data:**
50,000 landmarks from Google Map street views

<table>
<thead>
<tr>
<th>EXAMPLES</th>
<th>Landmark ID</th>
<th>Time</th>
<th>Street View</th>
<th>Landmark</th>
<th>Ease to recognize the landmark</th>
</tr>
</thead>
<tbody>
<tr>
<td>A1AU3</td>
<td>23:00</td>
<td><img src="image" alt="Nike Street View" /></td>
<td>Nike</td>
<td>Low</td>
<td></td>
</tr>
<tr>
<td>XUQ2D</td>
<td>13:00</td>
<td><img src="image" alt="Target Street View" /></td>
<td>Target</td>
<td>Medium</td>
<td></td>
</tr>
<tr>
<td>IOY2I</td>
<td>21:00</td>
<td><img src="image" alt="Marriott Street View" /></td>
<td>Marriott</td>
<td>Low</td>
<td></td>
</tr>
<tr>
<td>OIY3P</td>
<td>9:00</td>
<td><img src="image" alt="BP oil Street View" /></td>
<td>BP oil</td>
<td>High</td>
<td></td>
</tr>
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Data & ML Model

Professional raters for model building/ training
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Datasets
- Sample Routes
- Sample Landmarks

Features
- Safe
- Scenic
- Navigation

Labels
- Safety Level
- Enjoyment Level
- Ease level to recognize landmarks

Output
- Route Suggestions with safety and scenery concerns + proper navigation landmarks

User Feedback for Fine-tuning

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<tr>
<td>Journey End</td>
<td>Feedback survey skip</td>
<td>Binary Survey Dissatisfaction survey</td>
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Output
- Improved ML for Accuracy and Personalized Experience
‘Safe’ mode feedback

To improve:
- Route suggestion for safety.
- Personalized experience

Prompt Survey for User feedback:
- Why user think the route is not safe enough.

When to ask:
- When user not satisfied with suggested route after finishing or stopping a route.
To improve:
- Route recommendation process that understand user's walking limitations and time constraints better.

Prompt Survey for User feedback:
- Why user stopped route in active mode with time constraints

When to ask:
- User ended a route in the middle of the journey.
‘Scenic’ mode feedback

To improve:
- Route suggestion in enjoyment mode based on personal preference

Prompt Survey for User feedback:
- Why user not satisfied with the route

When to ask:
- When user click the thumb down button
### Success Metrics

<table>
<thead>
<tr>
<th>Goal</th>
<th>Signal</th>
<th>Metrics</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Google Walk</strong></td>
<td>More users enjoy using our to walk</td>
<td>Daily Active Users &amp; Monthly Active Users</td>
</tr>
<tr>
<td></td>
<td>1. How many users use our app</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2. What is their satisfaction</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Safe</strong></td>
<td><strong>Active</strong></td>
</tr>
<tr>
<td></td>
<td>Users feel more safe to walk</td>
<td>1. Encourage users to walk more</td>
</tr>
<tr>
<td></td>
<td>1. How safe do users feel about their walk</td>
<td>2. Save their time waiting for public transit</td>
</tr>
<tr>
<td></td>
<td><strong>Active</strong></td>
<td>1. How many people complete their fitness goal?</td>
</tr>
<tr>
<td></td>
<td>2. How much time do users spend on waiting for public transit</td>
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<td><strong>Scenic</strong></td>
<td><strong>Explore</strong></td>
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<td>Users enjoy walking to explore the city</td>
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Success Metrics

If the metrics drop below our target, depending on the severity, we will:

1. Low severity: Check our ML model
2. Mid severity: Conduct heuristic evaluation on usability
3. High severity: Conduct User Research Again & Market research
More to be expected
User Needs Hierarchy

Well-being as a overall theme
Aspects of well-being in different layers of human needs

Safety
Personal Security
Environment Safety

Enjoyment
Mental Pleasure
Social Connection

Esteem
Sense of Achievement

What users need

HMW help users to meet their needs

Walking as a Better Choice
Fit into people’s daily schedule
Goal setting and progress tracking
Walk for tangible benefits

Walk for Fun
Better scenery,
Interest places to explore,
Meet with people in common

Walk with Confidence
Low risk area
Access to help
Better lighting
Less hurdles
Easier wayfinding

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# Incentivisation Structure

Nudging people to **walk a little more**, by suggesting them **locations based offerings**

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<th>Business</th>
<th>Use Case</th>
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<td>Landmark navigation for easier way finding</td>
<td>Display open stores on a safer route</td>
</tr>
<tr>
<td><strong>Bring customer to door</strong></td>
<td><strong>More foot traffic to local brands</strong></td>
<td><strong>Raise awareness of businesses</strong></td>
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**Explore/wander Mode**

If the user likes technology, we will suggest to cover an additional technology store on their path

**Landmark Navigation**

If the user’s path involves partner stores, we can use them as landmarks when appropriate.

Benefit small business impacted by COVID

**Safe Mode**

When user is using safety mode, we will give information of open stores to boost confidence

# Confidence

**All Modes**

Fitness points as credits/discount points for business partners, showing up on the route user regular uses

# Self Fulfillment
# Tangible Reward
## Incentivisation Structure

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### User Case

- **More foot traffic to local brands**
- **Raise awareness of businesses**
- **Increase visits to stores and potentially increase sales**
- **# Curiosity**
- **# Confidence**
- **# Confidence**
- **# Self Fulfillment**
- **# Tangible Reward**
## Incentivisation Structure

Nudging people to **walk a little more**, by suggesting them **locations based offerings**

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<tr>
<th>User</th>
<th>Business</th>
<th>Use Case</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 min more walk to a place you would be interested</td>
<td>Landmark navigation for easier way finding</td>
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</tr>
<tr>
<td><strong>Bring customer to door</strong></td>
<td><strong>More foot traffic to local brands</strong></td>
<td><strong>Raise awareness of businesses</strong></td>
</tr>
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<td><strong>Explore/ wander Mode</strong></td>
<td><strong>Landmark Navigation</strong></td>
<td><strong>Safe Mode</strong></td>
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<tr>
<td>If the user likes technology, we will suggest to cover an additional technology store on their path</td>
<td>If the user’s path involves partner stores, we can use them as landmarks when appropriate.</td>
<td>When user is using safety mode, we will give information of open stores to boost confidence</td>
</tr>
<tr>
<td><strong># Curiosity</strong></td>
<td><strong># Confidence</strong></td>
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</tr>
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## Incentivisation Structure

Nudging people to **walk a little more**, by suggesting them **locations based offerings**

### User

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### Business

| Increase visits to stores and potentially increase sales |
| Bring customer to door |
| More foot traffic to local brands |
| Raise awareness of businesses |

### Use Case

| Benefit small business impacted by COVID |
| Explore/ wander Mode |
| Landmark Navigation |
| Safe Mode |

- If the user likes technology, we will suggest to cover an additional technology store on their path.
- If the user’s path involves partner stores, we can use them as landmarks when appropriate.
- When user is using safety mode, we will give information of open stores to boost confidence.

### All Modes

- Fitness points as credits/discount points for business partners, showing up on the route user regular uses.

| # Curiosity |
| # Confidence |
| # Confidence |
| # Self Fulfillment |
| # Tangible Reward |
# Incentivisation Structure

Nudging people to **walk a little more**, by suggesting them **locations based offerings**

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**Business**

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**Use Case**

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<th><strong>SAFE MODE</strong></th>
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**# Curiosity**

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**# Self Fulfillment**

**# Tangible Reward**
Product Roadmap

Our features ahead

1. Safe, Active & Scenic
   MVP with Essential Features

2. Inclusiveness
   Accessibility Mode

3. Connectedness
   Social Mode

Engaging

Rewards
8 months after 1st release

**Accessibility Improvement**

**Accessibility Mode**
- Device setting detection for recommendation

**Navigation optimization**
- Deeper customization for people with accessibility issues
Walk together with a group
- Allow walkers to join a walking group and walk together

Meet new walkers
- Meet new friends through walking
Google Walk Roadmap

1. Safe, Active & Scenic
   # The core

2. Accessibility Mode
   # Inclusiveness

3. Rewards
   # Motivation

4. Connected walking
   # Engaging
A step closer to a healthier life in all aspects.

1. Safe, Active & Scenic
   # The core

2. Accessibility Mode
   # Inclusiveness

3. Connected walking
   # Engaging

Rewards
   # Motivation
Walking ...
Walking with Google Walk
Walking no longer limits itself to only covering the ground between cars and buildings and the short distances within the latter.

But instead, it is regaining its meaning as

a Cultural Activity
a Pleasure
a Way of Getting Around
Thank you
ESSENTIAL

AI-powered grocery delivery service keeps your kitchen stocked with just enough essentials.
WHEN WE TALK ABOUT GROCERY STORE SHOPPING...

Keeping essentials stocked at home accounts for most time spent grocery shopping. But it’s the least enjoyable part of the shopping experience.

- Most of the time is tedious and boring grabbing the essential necessities
  “It’s boring to spend most of your time in the grocery store picking up the same things from the same shelves every time.” --- Jesse

- Few of the time is delightful: exploring new foods at the grocery store
  “Exploring new items in the grocery store with your family is a ritual that makes life more interesting.” ---- Hugo
PAIN POINTS

At home, it's hard to...
- Control **different consumption rate** of essentials
- Remember **what items** are already used up
- Plan **when and how much** to stock

Online, it's hard to...
- **Compare attributes** (i.e. nutrition, price) of different items
- **Know accurate delivery times** to avoid parcels being stolen
- Always get the right item and brand

In store, it's boring to...
- Go to **same aisles to get same things** as always
- **Track how much** has been added
- **Stand in line**
- Balance overall nutrition
COVID-19 PANDEMIC

72% of people are still hitting the grocery store;
83% of people have had issues with grocery delivery.
People need to minimize the time in stores and improve efficiency.

--- Bankrate.com & YouGov
USER NEEDS

- Predict food amount
- Delivery just-in-time
- Eat healthier at home
- Control spending on food
Essential

AI-powered grocery delivery service keeps your kitchen stocked with just enough essentials
HOW WOULD ESSENTIAL CHANGE THE GROCERY SHOPPING EXPERIENCE?

Before...

VS

Now...
PREREQUISITES

- Food consumption rate
- Available time schedule
ONBOARDING QUICKLY

- Household structure
- Eating habits
- Purchase history
- Smart home devices

- Food consumption rate
- Available time schedule
STEP 1/4

Tell us about your household structure

In order to help us better understand and predict how much food do you need
STEP 2/4

Tell us about your eating habits

In order to help us better adjust our recommendation frequency

STEP 1/4

In order to help us better understand and predict how much food do you need

Tell us about your household structure

- Senior (>65)
- Adult (20–64)
- Teenager (15–19)
- Children (<12)

Continue
STEP 3/4

Tell us more about how much you eat and store

In order to improve your initial experience
STEP 4/4

Do you want to connect Google home devices?

Automatically choose the right time to deliver
CORE USER SCENARIOS

Primary

Perfect quantity
Just-in-time delivery

Secondary

Healthier substitution
Prudent budget management
CORE USER SCENARIOS

Predict food amount

Delivery just-in-time

Eat healthier at home

Control spending on food
PERFECT QUANTITY

Food consumption rate

- Perfect quantity
- Perfect delivery frequency
PERFECT QUANTITY

Home page - Essentials’ status check (current, past, future)

- Incoming delivery
- Remaining essentials
- Future consumption
PERFECT QUANTITY

Recommended Essential List

- Personalized recommendations
- Auto-generated list
- Accurate quantity showcase
- Easy adjustment
CORE USER SCENARIOS

Predict food amount

Delivery just-in-time

Eat healthier at home

Control spending on food
JUST-IN-TIME DELIVERY

Available time periods

- Easy time scheduling
- Deliver whenever it is convenient for you
JUST-IN-TIME DELIVERY

Time scheduling

- Quick access
- Batch adjustment
**JUST-IN-TIME DELIVERY**

*Whenever you need*

- Personalized adjustable time interval
- Delivery time/address adjustment
- Order cancellation
CORE USER SCENARIOS

Predict food amount

Delivery just-in-time

Eat healthier at home

Control spending on food
HEALTHIER SUBSTITUTION

- Health condition
- Food preference
- Goal (optional)

→
- Biometrics & Diet profile
- Healthier substitution recommendations
HEALTHIER SUBSTITUTION

Biometrics & Diet profile

- Basic health info
- Health concerns
- Dietary dislikes
Healthier substitution

- Multidimensional parameter considerations
- Eating healthier at home without any pressure
CORE USER SCENARIOS

1. **Predict food amount**
2. **Delivery just-in-time**
3. **Eat healthier at home**
4. **Control spending on food**
PRUDENT BUDGET MANAGEMENT

- Budget range
- Food expenditure
- Budget reference and evaluation
PRUDENT BUDGET MANAGEMENT

Budget overview & evaluation

- All food channels’ spending overview
- Eating wisely without pressure
HOW AI HELP US ACHIEVE CORE SCENARIOS?

**AI is good at**

- Recognizing an entire class of entities
- Personalizing recommendations
- Predicting the future events

Predict food amount
Delivery just-in-time
Eat healthier at home
Control spend on food
ROADMAP

PHASE 1
Help people get essential food more efficiently online

PHASE 2
Help people explore new foods more efficiently online

PHASE 3
Augment the delight and efficiency of in-store shopping

PHASE 4
Build up an holistic and fun virtual grocery shopping experience at home

For a delightful grocery shopping experience

Essential
Delivery just-in-time
Predict food amount
Eat healthier at home
Control spend on food

Essential +
Customize food options by preference

AR

VR
HOW WE LEVERAGE AI

Needs → Data collecting → Labeling → Processing → Feedback

- Predict food amount
  - User input
  - Household number
  - Shopping app

- Food consumption
- Purchase history

- Frequency of eating at other channels

- Delivery just-in-time
  - User input
  - Smart home devices

- Availability at home for receiving food
  - Health app
  - Health guideline

- Eat healthier at home
  - Nutritionist
  - Dietitian
  - Food technologist

- Control spend on food
  - Budget app

- Data of health
- Data of food health

- Eating expenditure on other channels

Output
Feedback

Output
Feedback

Couples
Families
Roommates
FOOD QUANTITY DATASET

Purchase history

<table>
<thead>
<tr>
<th>EXAMPLES</th>
<th>FEATURES</th>
<th>Datasource</th>
</tr>
</thead>
<tbody>
<tr>
<td>Customer ID</td>
<td>Food Name</td>
<td>Date</td>
</tr>
<tr>
<td>User A</td>
<td>Eggs</td>
<td>6/14/2020</td>
</tr>
<tr>
<td>User B</td>
<td>Milk</td>
<td>6/15/2020</td>
</tr>
<tr>
<td>User C</td>
<td>Chicken</td>
<td>6/18/2020</td>
</tr>
</tbody>
</table>

Food storage and consumption

<table>
<thead>
<tr>
<th>EXAMPLES</th>
<th>FEATURES</th>
<th>LABELS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Customer ID</td>
<td>Household structure</td>
<td>Food Name</td>
</tr>
<tr>
<td>User A</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>User B</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>User C</td>
<td>0</td>
<td>1</td>
</tr>
</tbody>
</table>

Datasource
- Purchase history from Amazon
- Quantitative survey of 10,000 households across the U.S.
- Qualitative research - observing different types of families

- User input
- Partnering with Samsung to detect when items in the refrigerator have been depleted
- Weight data from the refrigerator or food containers to see how fast foods are eaten
**FOOD QUANTITY DATASET**

### Food storage and consumption

<table>
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<tr>
<th>EXAMPLES</th>
<th>FEATURE</th>
<th>LABELS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>CUSTOMER ID</strong></td>
<td>Household structure</td>
<td>Picture in the refrigerator</td>
</tr>
<tr>
<td></td>
<td>Adult</td>
<td>Seniors</td>
</tr>
<tr>
<td>User A</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>User B</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
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</table>

**Datasource**

- User input
- Partnering with Samsung to detect when items in the refrigerator have been depleted
POSSIBLE RATERS

- Understand how to estimate food consumption rate
- Be familiar with North American foods and how they are stored

American homemaker, Chef, Tidying expert, etc
HEALTHINESS DATASET

User Healthiness

**EXAMPLES**

<table>
<thead>
<tr>
<th>Customer ID</th>
<th>Age</th>
<th>BMI (Body mass index)</th>
<th>Blood Pressure</th>
<th>Calorie Consumption</th>
<th>Health Level (A-E)</th>
</tr>
</thead>
<tbody>
<tr>
<td>User A</td>
<td>18</td>
<td>16 - underweight</td>
<td>116/76</td>
<td>2000</td>
<td>B</td>
</tr>
<tr>
<td>User B</td>
<td>32</td>
<td>22 - normal weight</td>
<td>112/78</td>
<td>1800</td>
<td>A</td>
</tr>
<tr>
<td>User C</td>
<td>45</td>
<td>33 - obese</td>
<td>135/88</td>
<td>2500</td>
<td>C</td>
</tr>
</tbody>
</table>

**Features**

- Age
- BMI (Body mass index)
- Blood Pressure
- Calorie Consumption

**Labels**

- Health Level (A-E)

**DataSource**

- Exercise/lifestyle IoT/App
  (Apple Health, Peloton, Shopwell, etc)
- USDA Datasets
  (Food nutrition facts, Dietary guideline)

Food Healthiness

**EXAMPLES**

| Food Name | Brand                  | Calories (kcal/100g) | Carbs (g) | Fat (g) | Protein (g) | Cholesterol (mg) | Sugar (g) | Possible Allergens | Health Level (A-E) | Not friendly to...
<table>
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<tr>
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<th></th>
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<th></th>
<th></th>
<th></th>
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</tr>
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<tbody>
<tr>
<td>Pork belly</td>
<td>Cermark</td>
<td>521</td>
<td>0</td>
<td>53.01</td>
<td>9.34</td>
<td>72</td>
<td>0</td>
<td>Albumin</td>
<td>B</td>
<td>High Cholesterol</td>
</tr>
<tr>
<td>Milk</td>
<td>Dean’s</td>
<td>67</td>
<td>5.42</td>
<td>3.33</td>
<td>3.75</td>
<td>15</td>
<td>5</td>
<td>Lactose</td>
<td>A</td>
<td>Lactose intolerance</td>
</tr>
<tr>
<td>Cheesecake</td>
<td>The Cheese Factory</td>
<td>321</td>
<td>25.5</td>
<td>22.5</td>
<td>5.5</td>
<td>55</td>
<td>21.8</td>
<td>Cheese</td>
<td>C</td>
<td>Diabetes</td>
</tr>
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</table>
POSSIBLE RATERS

- Understand how to estimate food consumption rate
- Possess a background in nutrition-related disciplines.

Nutritionist, Dietitian, Food Technologist, etc
HOW WE LEVERAGE AI

Needs → Data collecting → Labeling → Processing → Feedback

Predict food amount
- Food consumption
- Purchase history

Delivery just-in-time
- Availability at home for receiving food

Eat healthier at home
- Data of health
- Data of food health

Control spend on food
- Eating expenditure on other channels

Output
- Couples
- Families
- Roommates

Artificial Intelligence

Feedback
FEEDBACK

- Introduce features at the right moment
- Collect user feedback in easy and gamified ways
Feature disclosure

Introduce healthy substitution and budget management features in-context
Explicit

Substitution feedback
Check with a quick follow-up question when people dismiss the healthier food suggestion to understand users preference throughly.
Explicit

Adjustment follow-up

Tie explanations to user actions by asking simple question when users manually adjust the food quantity
EXPLICIT

Daily toast notification
Display model confidence in a gamified way, optimize users’ understanding with example-based explanations
On-call delivery

Simplify the delivery process by reminding users with a notification shortcut and collect users’ feedback on delivery time to improve the accuracy of future delivery time options.
In-product rating

Ask users to recall and rate their latest delivery experience in order to improve the future service accordingly.
SUCCESS METRICS

Our target of user acceptance

Quantity 95%
Delivery time 90%
Health substitution 80%

Our principle & action
If the user’s average rate of acceptance in the last 30 days drops below the target, we will talk to users about their experience & check our ML model.
Next generation of Google Maps

Google Go!

Life is more than going from A to B.

Team 3 | Xuanyu Chen, Sike Liu, Shiya Xiao, Evie Yu, instructed by Ryan Powell
People rely on digital maps for travel almost everyday

The current Google Maps is already the best solution for people to navigate during the trip.

The current experience, however, can always get better.

There are still many ways for Google Maps to fit better into people's real-life behaviors.

Photo: Chris Welch / The Verge
Users rarely go from point A to B, but real life is more about going from A to [B, C, D].

The current Google Maps is just about going from A to B and finding the shortest distance for users.

“There are so many Trader Joe’s in the city. But I want to go to the one at South Loop instead of the one near me because I can go to the Jewel Osco as well if I can’t find what I want to buy.”

Jennifer
Users would more like to use multiple transportation modes in one single trip.

The current Google Maps forces users to choose only one mode.

“I have my regular route for school, but sometimes I want to stop at the post office on the way to school. It is too pricey to call Uber twice, but walking is also not my first option because of Chicago's long winter.”

Emily
Users need an easy, straight-forward, intuitive experience.

The current Google Maps navigates users with no priority. This leads to repeated interactions with the app during the trip.

“When I am driving alone, if I want to go to the gas station during the trip, I have to pull over, take the phone off from the stand, and search for it and re-plan my trip.”

Yousef
## Opportunity: A more user-centered solution that considers real life usage

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<tr>
<th>User needs</th>
<th>Current Google Maps</th>
<th>Opportunity</th>
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<td>The Google Maps is just about going from A to B and finding the shortest distance for users.</td>
<td>A tool helps users' tasks in multiple locations done.</td>
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<tr>
<td>Users would more like to use multiple transportation modes in one single trip.</td>
<td>The Google Maps forces users to choose only one mode.</td>
<td>A tool is more flexible: customize route and transportation modes based on personal needs and conditions.</td>
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<tr>
<td>Users need an easy, straightforward, intuitive experience.</td>
<td>The Google Maps navigates users with no priority. This leads to repeated interactions with the app during the trip.</td>
<td>A tool can recommend users of key points during the trip and predict possible middle stops.</td>
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Life is more than going from A to B.
AI-powered Google Go! helps people complete their multiple tasks.

Let’s go from A to B, C, D, and places you need!

Google Go! focuses on the user journey from planning to on-the-road experience.

Google Go! suggests combinations of stops to users to help them plan and customize their multiple-stop trip based on their personal needs and conditions.
Google Go! uses **AI to augment** users' ability to find the right route based on their daily needs and conditions.

With Google Go!, figuring out a suitable route to finish multiple tasks while considering various factors will no longer be a challenge to users.

- Users’ ability to choose could to be enhanced by AI suggestions.
  - Mainly based on patterns learned from a large number of users' daily trips. The AI-powered Map can predict personalized routes and give proper suggestions for different users to plan their route.
  - Users can also take advantage of AI's ability to consider multiple factors (e.g., place busyness, daily weather, route cost) during their route planning process to help them find the best route easily.
Onboarding

- Do you hate reading maps?
- Do you get tired of choosing the destinations to meet your various daily needs?
- Do you get bored with calculating and comparing the routes by yourself all the time?

If yes, try the new version of Google Maps! Google Go!

Mainly based on your preference and also patterns learned from a large number of users' daily trips. It will gradually adapt to the pace of your everyday life and recommend routes even for multi-tasks.

When the user search a specific place as usual (previous mental model), the app gives the user a recommendation/prediction to help transition.
Meet Nick

28 years old
Live in Chicago
Heavy map user
Primary Goal:
Arrive to work on time, while dropping by Starbucks on the way (considering weather issues).

Monday morning, Nick wakes at 7 am.

He wants to get a coffee and a sandwich on the way to work.

The weather is about to snow, which makes him worried about being late.

He opens the Google Go!
Recommend stops based on the user's trip history, store busyness, weather, etc.

Drag the stop buttons to add to/ remove from your trip, or change the sequence of these stops

Change the user's regular transportation modes

Predict and suggest other places that the user's may want to go
The user is able to edit stops

The value of this route option

Swipe to check other route options

The reason for the recommendation
Commute - Route options page with map

- Swipe down to see the route plan on map
- Compare the routes visually
Nick wakes up at 11 am. He realizes he needs to **buy some groceries** as usual.

Also, it's almost lunchtime. He wants to eat something.

He also wants to **return a book to his friends**.

He opens the Google Go!.

**Primary Goal:**

Efficiently do weekly tasks and go to multiple places in one trip
Recommend stops based on the user’s trip history, store busyness, etc.

Drag the stop buttons to add to/ remove from your trip, or change the sequence of these stops.

User can add multiple transportation modes for this trip.
Search multiple places at one time

The user can directly add stops into the trip on this search page

Show the most important information for users to find places quickly

Recommend nearby and similar places based on the user’s preference
The user can add new stops to the trip, and change the order.
The main value of the trip is articulated in keywords:

- Transportation modes and time needed

The reason of the recommendation:

Run errands - Route option page
Run errands - Route plan 1

Swipe right or left to check different route options.
Run errands - Route plan 2
The next stop: Showing the progress of the route

Recommend possible middle stops to add to the trip

An intuitive way to estimate the key point of the trip by using time and give users a sense of security

Show landmarks as references to help better locate the place
The user selects the option to add the gas station to the trip.

Showing the best stops around with values.

Click the logo to add the stop to the trip.

Users can also use the voice commands to interact with the app during the navigation.
The combination of two kinds of maps to help navigation

Key notification

Show important landmarks

Run errands - Navigation street view - Walking
Exploration - Scenario 3

The weather is really nice!

Nick wants to explore places he has not been to alone, but he has no plan about it.

He opens the Google Go!

Primary Goal:

Wants to have fun, but doesn't have specific destinations in mind (but he does have time constraints).
Select a theme for the trip

Select time availability

Present several pre-bundled trip options and label them

Click to have a detail view of this route

Change the options like a slot machine
User can add stops, remove stops and favorite stops

Suggest nearby and similar places that user might have interests
Nick gives 5 stars
How we leverage AI in this process to make the magic happen?
Model training process (logistics)

Datasets -> ML Model

Raters

Implicit feedback from product logs

ML Model:
Prediction / Suggestion
Based on day and time and users patterns to know which trip occasions that users might want.

Adjust ML model by daily users' data

Recommend route options to

Users

Explicit feedback from users
Model training process (logistics)

Eg. Task: grocery shopping

- **Datasets**
- **Raters**
- **ML Model**
  - Prediction / Suggestion
  - For example:
    - Based on day and time and user patterns to know which trip occasions that users might want.
    - Then recommend this route to the user
  - Route 1: Jewel Osco + Wholefoods
  - Route 2: Jewel Osco + Trader Joe's
  - Route 3: Jewel Osco + Target
  - User wants to go
    - Jewel Osco
    - Target
  - User adjusts ML model by daily users' data

**User feedback**

- **Implicit feedback from product logs**
  - If dwell time is less than 10 mins:
    - Return items
  - If dwell time is more than 20 mins:
    - Jewelry

- **Explicit feedback from users**
  - Themes of trip
  - Trip satisfaction

**Examples**

- For example:
  - Based on day and time and user patterns to know which trip occasions that users might want.
  - Then recommend this route to the user

**Model training process (logistics)**

Eg. Task: grocery shopping

- **Datasets**
- **Raters**
- **ML Model**
  - Prediction / Suggestion
  - For example:
    - Based on day and time and user patterns to know which trip occasions that users might want.
    - Then recommend this route to the user
  - Route 1: Jewel Osco + Wholefoods
  - Route 2: Jewel Osco + Trader Joe’s
  - Route 3: Jewel Osco + Target
  - User wants to go
    - Jewel Osco
    - Target
  - User adjusts ML model by daily users’ data

**User feedback**

- **Implicit feedback from product logs**
  - If dwell time is less than 10 mins:
    - Return items
  - If dwell time is more than 20 mins:
    - Jewelry

- **Explicit feedback from users**
  - Themes of trip
  - Trip satisfaction

**Examples**

- For example:
  - Based on day and time and user patterns to know which trip occasions that users might want.
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**Model training process (logistics)**

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  - Themes of trip
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**Examples**

- For example:
  - Based on day and time and user patterns to know which trip occasions that users might want.
  - Then recommend this route to the user
ML Model Dataset (related to the rater dataset)

Datasets → Raters → ML Model

- **Implicit feedback from product logs**
- **Explicit feedback from users**

ML Model:
- Prediction / Suggestion
- Based on day and time and users patterns to know which trip occasions that users might want.

Adjust ML model by daily users' data

Recommend route options to Users
ML Model Dataset (related to the rater dataset)

**User need**

- Make multiple stops in a single trip as efficiently as possible (across different trip occasions)

**Training datasets needed**

- Actual trips with information like number of stops, place types, etc.

**ML system learning**

- Pattern of user behaviors when doing multiple tasks during one single trip

**User action**

- Try the recommended trip options to finish multiple tasks during one single trip
- Edit the initial recommended trip option according to the user's needs
- Search specific places that the user wants to go

**ML system output**

- Suggest *trip options for the specific trip occasion* including stops, orders, etc., based on the user's current situation
- Present *several trip bundles* based on personal interests
Determine the type of routes

(data cleaning) Threshold for a single trip:

Single Trip = dwell time of each stop < 3 hours, and proximity of stops < 15 miles

<table>
<thead>
<tr>
<th>User ID</th>
<th>Day &amp; Time</th>
<th>Number of stops (including destination)</th>
<th>Starting point</th>
<th>Place Type</th>
<th>Dwell time</th>
<th>Trip Occasions</th>
</tr>
</thead>
<tbody>
<tr>
<td>AV3DE</td>
<td>Monday 8:34 am</td>
<td>2</td>
<td>Home</td>
<td>Coffee shop + Institution</td>
<td>00:10:04, 6:05:56 (starbucks+kaplan)</td>
<td>Commute to work/school</td>
</tr>
<tr>
<td>X8KGF</td>
<td>Saturday 11:43 am</td>
<td>4</td>
<td>Home</td>
<td>Grocery + Restaurant + Home</td>
<td>01:06:35, 00:28:00, 00:07:23, 7:00:43 (restaurant+grocery+grocery+home)</td>
<td>Grocery shopping</td>
</tr>
<tr>
<td>BH9IU</td>
<td>Friday 6:00 pm</td>
<td>3</td>
<td>Work</td>
<td>Restaurant + Bar + Club</td>
<td>00:40:00, 01:20:00, 3:00:43</td>
<td>Nightlife / have fun</td>
</tr>
<tr>
<td>ER0PL</td>
<td>Sunday 2:00 pm</td>
<td>4</td>
<td>Park</td>
<td>Art + Shop + Park + Home</td>
<td>01:03:45, 00:20:34, 01:37:29, 13:00:12</td>
<td>Relax</td>
</tr>
<tr>
<td>PO1EB</td>
<td>Wednesday 11:00 pm</td>
<td>1</td>
<td>Work</td>
<td>Home</td>
<td>07:33:16</td>
<td>Go home</td>
</tr>
</tbody>
</table>
ML Model Raters

Datasets → ML Model

Raters

Implicit feedback from product logs

Prediction / Suggestion
Based on day and time and users patterns to know which trip occasions that users might want.

Adjust ML model by daily users’ data

Explicit feedback from users

Recommend route options to Users
ML Model Raters

Rater Recruitment & Qualification:

- People live in different parts of the city (for example suburbs v.s. city), of different demographics (for example different ages and ethnicities)
- People who rely on map applications, active users of Google Maps
- Both drivers and riders
- Diverse profession groups

Particular perspectives or possible bias:

- Proficiency in using smartphones
- Search using different language terms
- Residents v.s. Traveler (people new to the city)
User feedback for refining Google Go! 's ML model

Implicit feedback from product logs

Explicit feedback from users

Datasets

Raters

ML Model

Prediction / Suggestion
Based on day and time and users patterns to know which trip occasions that users might want.

Adjust ML model by daily users' data

Recommend route options to

Users
User feedback for refining Google Go!'s ML model

Implicit Feedback

Collect data about user behavior and interactions from the product logs.

1. The number of times users accept or reject the recommendations
2. The number of times users change the initially recommended options, like editing specific stops, orders, etc.
3. How users change the initially recommended options

Explicit Feedback

Get feedback from users after finishing or stopping the trip. Randomly select users from the whole user groups to ask feedback.

1. The satisfaction of recommended stops. (10% Users)
2. The satisfaction of recommended routes and labels for routes. (20% Users)
3. The satisfaction of exploration recommendation. (10% Users)
4. Reasons for quitting or dissatisfaction
User feedback for refining Google Go! 's ML model

Ask for feedback

Response after user give feedback

Feedback of quitting in the middle
Success Metrics 1:

Task Success (Effectiveness, Efficiency)

Related Google Go! features:

- Recommend stop combinations and prioritize routes according to the current situation, user choices, and past behaviors
- Optimized destination searching results based on user preference

Effectiveness
Percent of users select the recommended stops/route plans instead of editing by themself.

If

Drops below

85%

We will

Check the user profile, do more user study, and iterate the ML model.

Efficiency
The time it takes users to swipe through route options and select one.

If

Goes above

45 seconds

We will

Analyze how user interaction in each step, do users research and revisit the ML model.
Success Metrics 2:

Engagement (Involvement)

Related Google Go! features:

- Appropriate key points prediction during the trip

Users’ involvement
Choose the popping up recommendations directly during the trip.

Drops below 80%

We will

Check the ML model of immediate recommendations.
Make Google Go! the best product for people to explore and navigate their world.
Thank you!

Team 3 | Xuanyu Chen, Sike Liu, Shiya Xiao, Evie Yu
A navigation app that generate and prioritize safe and reliable travel plans tailored for people with visual impairments through machine learning.
On-boarding

You can navigate your daily trip with personalized and considerate plan based on your own preferences.

We have 1 billion monthly active users, 25 million daily updates to build our plan database.

Also, you don’t need to be worried about unexpected changes during your trip with our dynamic back up plan!

Ready to Go
Globally, at least 2.2 billion people have a vision impairment or blindness, 44.2% economically support their family like everyone else.

“**They are been afforded their own independence, their own freedom.**”

Mar-Molinero, talking about the importance of designing with inclusion in mind.

Reference:
Opportunity

Traveling is still one of the major challenges in their daily lives.

With visual impairment, people with visual impairment receive far less information during their trip outside than people without visual impairment, which prevent them making decision of trip quickly and increase the intense in their daily trip.

*We want help them to have confidence so that they can go wherever and whenever they want with comfort and safety. For their own independence, their own freedom.*
Why is AI a good fit?

- It can manage a huge amount of real-time information. **Reducing the mental stress in that high stakes situation** when they travel.

- Keep monitor and Quickly respond unexpected external information to users. **Augment the capabilities of gaining information from outside.** Enable user to feel responsible for navigation.

- Machine learning has memory to track and understand complicated personal preference. To record user-specific travel preferences, resulting in more accurate and time-sensitive plans.

**Augmentation**

- Prediction
- Massive Calculation
- Personalization
- Adapt Evolving Situation
Problem 1

How might we support users with a specific and considerate plan before trip?

Problem 2

How might we enable users to handle the various unexpected changes during their trip?
Introduce your solution

Base on the original navigation function of Google map, consider more elements that will affect the travel experience of people with visual impairment, to generate more considerate trip plan.

Keep tracking and learning user’s selection and behaviors and using at internal dataset to generate personalized plan.

- Travel route planning in advance
- Real-time reroute/ replan
- Potential unexpected changes pre-alert
- Plan optimization/personalization
ML mainly to help identify two patterns in supporting our users navigate independently.

**ML System Learning**

- Patterns of behavior around accepting plan, completing trip, and improving suggesting accuracy
- Patterns of behavior around accepting change plan prompts, completing trips, and decreasing anxiety level

**ML Goal**

- Determine what plans are the best choices for the current situation and what information the users needed most to follow that plan.
- Determine in what situation the product need to prompt users to consider changing their plan.
**AI related Design Challenge**

How can we leverage the understanding of user behaviour pattern without over-predict where user want to go?

ML outcome: user travel pattern

---

Andy needs to go to a place on his own for the first time, he is expected to arrive 5 days later Monday 9 a.m. It will be his new routine for the following 3 months.
AI related Design Challenge

How can we leverage the ML outcome to prioritize plans for Andy in a meaningful way?

Pattern: User preference

We have two plans for you...

Nav+ read through plan options with personalized filtered information that matters to Andy most.
AI related Design Challenge

How can we help Andy navigate through different options and learn from his choice?

Pattern: User preference

Andy went through different options and picked his favourite option. He also agreed to the system recommendation in double check the feasibility of the plan a day ahead, Sunday night.
AI related Design Challenge

How can we leverage the prediction to prompt useful tips to our users?

Pattern: General prediction

Sunday night, Andy received a confirmation from nav+ that everything seems fine. Nav also made a suggestion that since Andy is expected to have a "noisy but walkable" 10 min walk during transfer, he should take earphones with him.
AI related Design Challenge

How can we tailor the guidance for different users?

Pattern: User uncertainty tolerance level.

While walking to the new train station, there is a moment Andy got very confused. Nav confirmed with Andy that he is walking in the right direction but he heard train coming on his right. Nav noticed Andy stopped and double checked the Nav instruction. Nav prompted a guidance and asked him if he could help him.
AI related Design Challenge

How can we collect meaningful user feedback to help improve the system and personalization without them feel overwhelmed?

Pattern: User’s preference

On arriving the place, Nav+ confirmed with Andy that he had no trouble finding the entrance. Andy was asked to rate the trip in general. Nav also saved the trip to Andy’s history where he can come and give more qualitative feedback in details.
External Public Dataset

Generic geo-based info
- Weather Condition: Snowfall/Rainfall/Temperature
- Noise Level
- Crowdedness
- Crime Rate
- Traffic

POI
- POI Info: Accessibility / Business Hour / Dog friendly

Public Vehicle Condition
- Vehicle Situation: Accessibility/Hygiene
- Transfer Condition: Indoor-outdoor / Payment / Service Compatibility (change in rail location)

Internal Product Dataset

Active User Input

Trip planning
- Time/Date/Expected Arriving
- Location_Start/End/Middle Point
- Transit type for the current trip: Public Transit
- Marked POI, Favourite/Want to go...
- Quantitative Feedback: Rating/Label
- Qualitative Feedback

System Setting
- Preference Setting: Language/word size/rigid request

Basic Processed data

Walking distance
- Time offset: Extra time/saved time
- Visit History/frequency

Passive user data collection

Acceptance
- Usage Timing/Location
- Visit History
- ???

ML Outcome Refering Points dataset

Walking comfort level
- Time efficiency
- Acceptable weather condition
- Accessible level of Transportation & Facilities
- Vehicle safety level
- Anxiety trigger percentage
Information flow
### Scenario 01 behind the scene

<table>
<thead>
<tr>
<th>EXAMLES</th>
<th>Plan ID</th>
<th>Weather Condition</th>
<th>Length of the trip</th>
<th>Transfer Condition</th>
<th>FEATURES</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>In station crowdedness</td>
</tr>
<tr>
<td>L3S98NM</td>
<td>25(ac)</td>
<td>1.8mm</td>
<td>40mins</td>
<td>&lt;15mins</td>
<td>Yes</td>
</tr>
<tr>
<td>NM19S0L</td>
<td>-15(n)</td>
<td>0.3mm</td>
<td>1hr 10mins</td>
<td>&gt;30mins</td>
<td>Yes</td>
</tr>
<tr>
<td>S34LW7B</td>
<td>18 (ac)</td>
<td>0mm</td>
<td>20mins</td>
<td>15-30mins</td>
<td>No</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Noise Level</th>
<th>Accessible Entrance</th>
<th>Vehicle Situation</th>
<th>Elevation</th>
<th>Relevant event</th>
</tr>
</thead>
<tbody>
<tr>
<td>High 10 mins</td>
<td>Yes</td>
<td>No smell</td>
<td>Low</td>
<td>2 Yes</td>
</tr>
<tr>
<td>Medium 10 mins</td>
<td>Yes</td>
<td>All seats taken</td>
<td>0</td>
<td>Yes</td>
</tr>
<tr>
<td>Low 8min</td>
<td>Yes</td>
<td>Have smell</td>
<td>50%</td>
<td>3 Yes</td>
</tr>
<tr>
<td>Low 3min</td>
<td>Yes</td>
<td>Usually many seats available</td>
<td>30%</td>
<td>3 No</td>
</tr>
<tr>
<td>Low 3min</td>
<td>Yes</td>
<td>No smell</td>
<td>30%</td>
<td>No</td>
</tr>
</tbody>
</table>

**LABELS**

- Overall Comfort: high, low
- Physically Challenging?: high, low
- Dog Friendly?: high, low
Success metrics
Globally, at least 2.2 billion people have a vision impairment or blindness, 44.2% economically support their family like everyone else.

44.2% of people who are blind are employed, they are supporting families and raising children just like people without disabilities.


“He’s been afforded his own independence, his own freedom.”

Mar-Molinero, talking about the importance of designing with inclusion in mind.
Insights

People with visual impairment need more support in navigating independently.

Plan with specific info needs in details

There are several information critical for our algorithm to learn in order to generate considerate plan for our users to follow.

“If it go to a large building downtown, that can actually be kind of challenging to find that accessible door.”

Support a holistic understanding of the surroundings

There are only one place where blind people can find speaker that announces all train schedule.

“There are only one place where blind people can find speaker that announces all train schedule.”

Plan for two

The plans we generated need to take our users best friend’s into consideration.

“If there are wintry weather conditions/fresh snow, the sidewalks aren't clear, it's hard for my dog to find the route because the sidewalk is covered.”
How it works?

User journey in our product
Scenario 02: The users want to be able to easily adjust their trip in response to the changing situation
User journey in product

Data flow

Interface interaction (screens)
ML mainly to help identify two patterns in supporting our users navigate independently.

**ML System Learning**

Patterns of behavior around accepting plan, completing trip, and improving suggesting accuracy

Patterns of behavior around accepting change plan prompts, completing trips, and decreasing anxiety level

**ML Goal**

Determine what plans are the best choices for the current situation and what information the users needed most to follow that plan.

Determine in what situation the product need to prompt users to consider changing their plan.
怎么从Google跳转过来的
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You can navigate your daily trip with personalized and considerate plans based on your own preferences.

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Also, you don’t need to be worried about unexpected changes during your trip with our dynamic backup plan!

Ready to Go
Design Principle
1. 兼顾 low vision 和 blind，在保证 audio interaction 合理的同时，还要明确有视觉信息优先级
2. Screen reader 的模式下，如何保证 blind people 的信息获取最效化

如何及时确定用户对于信息的接受情况 - 是否有 lost 或者信息的误读

Screen:
1. navigation 2. collection 3. Real Time location sharing. (login/ confirmation/ use)
Scenario 01: The users want to have a personalized and considerate plan to support them navigate to a new place on time.

Let me plan for it...

Client from Access Living...

Thursday morning...

We have two plans for you...
## Design Challenge
How can we ....

### Scenrio:
- **Description**
- **Insights**
- **Quotes**

### Screen reader order?
Design Challenge
How can we ....

Scenario: description
Design Challenge
How can we ....

Scenario: description
Behind the scene
5 Insight Statements

By selecting a combination of the most interesting and most recurring observations, we chose a small number of themes to write short insight statements, ranging from full sentences to high level thoughts.

1 Lack of consistency
   Even though accessible details and communications have been added for people with disabilities, they are often unhelpful because of poor and inconsistent placement.

2 Not afraid to defend their rights
   When other passengers and transit employees break rules and show a lack of empathy and respect, people with disabilities often have to defend the rights and dignity ADA has granted to them.

3 Multiple confirmations
   People with disabilities are unable to easily overcome problems they incur on their journey and therefore spend much more time confirming every detail before their trip to avoid them as much as possible.

4 Limited options
   Unreliable service issues can cause people with disabilities to become stranded without a way home since they don’t have a wide range of transit options available when public transportation fails them.

5 Assistant tools
   Based off their own prior experiences, each person with a disability will develop a unique routine and personalized set of accessories to prepare them for anything on their journey.
Guiding Principles

Each individual insight statement has led us to a coupled guiding principle that might help develop of more equitable transit system for people with disabilities.

1. **Be consistent to improve navigation**
   Enable clear navigation through predictable, consistent placement of accessible features, the built environment near access points and the transfer throughout the whole transportation system.

2. **Create respectful interactions**
   Foster meaningful, dignifying communication and interactions between people with disabilities, public transit employees, and other passengers through the public awareness of the rules.

3. **Provide a wider spectrum of important information**
   Provide reliable, on-demand access to all relevant information necessary to navigate the public transit journey.

4. **Improve access to alternatives**
   Connect passengers quickly to alternate modes of transit when unpredictable barriers prevent them from reaching the destination.

5. **Facilitate personalized navigation needs**
   Support a steep reduction in the learning curve to navigating public transit and finding the best routes for each person by accommodating the use of any unique situational and personal tools that aid to reach their destination safely.
## How it works?

How does the system work? How does it help people with VI? The system has several key features and outputs.

### Users
- **People with VI (low vision & blind specifically)**
- **User need**: The users want to have a personalized and considerate plan to support them navigate to a new place on time.
- **User action**: Based on their preferences, user will
  1. Receive a filtered plan list with summary to choose from
  2. Get reminder if they saved a pre-planned trip (optional)
  3. Rate the plan or adjust the preference (optional)
- **ML system output**: Recommendations for the trip plan
- **ML system learning**: Patterns of behavior around accepting plan, completing trip, and improving suggesting accuracy (patterns of perceiving certain situation as walking friendly for people with VI)
- **Training dataset needed**: Set of travel plans that users are familiar with, have used and liked.
- **Key features needed in dataset**: Weather condition (Rainfall/ Snowfall/ Temperature), Soundscape(noise level & audio accessibility), Transfer situation (Consistency / times / spending / indoor-outdoor), Relevant event, Crowdedness, Accessibility, Situation of Vehicle, Functionality
- **Key labels needed in dataset**: 1) The functionality of suggested plan
  2) User acceptance or rejection of suggested plans
  3) Reasons for "dislike" or "rejection" (preferences) : Users' level of acceptance of individual key features priority of different key features
- **Data source key questions**: "How can the app know the real-time changes in my surroundings?" "Is this information up to date?"
- **Possible questions from Raters**: "Is the recommended plan can make users go to work on time? (function normally)?" 
  "Could user possibly accept this plan?"
  "If not, what's the reasons?" 
  "Can users accept this level of xxx (key attributes)? too high or too low?" 
  "If this number of key attributes affect the plan at the same time, which one have more impact? would users prioritize any specific attributes?"

### How the system works?

Based on the user's preferences, the system will:
1. Notify about the cause of the changing situation
2. Get notified about the predicted outcome if they stick with the current plan
3. Receive a filtered regenerated plan list with summary to consider
4. Choose a plan
5. Rate the plan

**ML system output:**
- **Recommendations for the trip plan**
- **ML system learning:** Patterns of behavior around accepting change plan prompts, completing trips, and decreasing anxiety level
- **Training dataset needed**: Set of situations user might consider change their plan
- **Key features needed in dataset**: Time delay/saved
- **Key labels needed in dataset**: Changes in:
  1. Weather condition (Rainfall/ Snowfall/ Temperature)
  2. Soundscape (noise level & audio accessibility)
  3. Transfer situation (Consistency / times / spending / indoor-outdoor)
  4. Relevant event
  5. Crowdiness
  6. Accessibility
  7. Situation of Vehicle
- **Data source key questions**: "How can the app know the real-time changes in my surroundings?" "Is this information up to date?"
- **Possible questions from Raters**: "Where does the new suggested alternative plans come from?"
  "How certain is the app in its recommendation?"
Appendix
We focus

Why Google map

1. Google map has the largest user-group in the market, which has huge-amount of data base.
2. Google map has a special accessible version, and also has more detailed navigation services for visually impaired people like voice guidance service.

So our scope is building an add-on service for Google Maps, which can better serve visually impaired users, and can also help Google improve the existing voice guidance service for people with difficulty to navigation.
How Nav+ want to add on Google Map?  
What Google did

**Formulate universal travel plans.** The priority of the planned route is still based on time and the occurrence of very serious incidents.

**Detailed voice navigation instructions.**
- Number of pedestrians ahead,
- Signal lights,
- Where is the train and cross road
- How long does it take to turn, etc.

**Real-time feedback or description** from the user. (Is this bus crowded?)

What is our goal to add-on

**Automatic user identification** (low vision/blind/ regular)

**Formulate travel plans that better support more specific user group - people with VI.** Engaging more detailed needs of the visually impaired user.
- Weather
- Noise

**Detailed voice navigation instructions.**
- Situation of public transit vehicles
- Adjustable back up plan(route)
### How it works?

<table>
<thead>
<tr>
<th>Users</th>
<th>People with VI (low vision &amp; blind specifically)</th>
<th>People with VI (low vision &amp; blind specifically)</th>
</tr>
</thead>
<tbody>
<tr>
<td>User need</td>
<td>The users want to have a personalized and considerate plan to support them navigate to a new place on time</td>
<td>The users want to be able to easily adjust their trip in response to the changing situation</td>
</tr>
<tr>
<td>User action</td>
<td>Based on their preferences, user will 1) Receive a filtered plan list with summary to choose from 2) Get reminder if they saved a pre-planned trip (optional) 3) Rate the plan or adjust the preference (optional)</td>
<td>Based on their preferences, user will 1) Get notified about the cause of the changing situation 2) Get notified about the predicted outcome if they stick with the current plan 3) Receive a filtered regenerated plan list with summary to consider 4) Choose a plan 5) Rate the plan</td>
</tr>
<tr>
<td>ML system output</td>
<td>Recommendations for the trip plan</td>
<td>1) the predicted outcome if they stick with the current plan 2) the current situation get identified as a “change your plan alert” trigger 3) a filtered regenerated plan list with summary to consider</td>
</tr>
<tr>
<td>ML system learning</td>
<td>Patterns of behavior around accepting plan, completing trip, and improving suggesting accuracy (Patterns of perceiving certain situation as walking friendly for people with VI)</td>
<td>Patterns of behavior around accepting change plan prompts, completing trips, and decreasing anxiety level</td>
</tr>
<tr>
<td>Training dataset needed</td>
<td>Set of travel plans that users are familiar with, have used and liked.</td>
<td>1) Sets of situation user might consider change their plan 2) Set of solutions to help user adjust their plan when they run into situation that meet the criteria of triggering alert</td>
</tr>
<tr>
<td>Key features needed in dataset</td>
<td>Weather condition (Rainfall/ Snowfall/ Temperatrue) Soundscape(noise level &amp; audio accessibility) Transfer situation (Consistency / times / spending / indoor-outdoor) Relevant event Crowdedness Accessibility Situation of Vehicle Walkability*</td>
<td>Time delay/saved Changes in: Weather condition (Rainfall/ Snowfall/ Temperatrue) Soundscape(noise level &amp; audio accessibility) Transfer situation (Consistency / times / spending / indoor-outdoor) Relevant event Crowdedness Accessibility Situation of Vehicle</td>
</tr>
<tr>
<td>Key labels needed in dataset</td>
<td>1) The functionality of suggested plan 2) User acceptance or rejection of suggested plans 3) Reasons for &quot;dislike&quot; or &quot;rejection&quot; (preferences) : Users' level of acceptance of individual key features priority of different key features</td>
<td>users reject/accept the recommended new routes, users reject/accept the pre-informed information of real-time changes, users rating for routes (if changed) User generated feedback as to why suggestion was rejected/quick survey</td>
</tr>
<tr>
<td>Data source key questions</td>
<td>&quot;How can the app know the real-time changes in my surroundings?&quot; &quot;is this information up to date?&quot;</td>
<td>&quot;How can the app know the real-time changes in my surroundings?&quot; &quot;is this information up to date?&quot;</td>
</tr>
</tbody>
</table>
| Possible questions from Raters | "Is the recommended plan can make users go to work on time?" "normal"
"could users possibly accept this plan?"
"If not, what’s the reasons?"
"can users accept this level of xxx (key attributes) too high or too low?"
"If this number of key attributes affect the plan at the same time, which one have more impact? would users prioritize any specific attributes?" | "How can the app know the real-time changes in my surroundings?" "Where does the new suggested alternative plans come from?" "How certain is the app in its recommendation?" |
fin
Why include AI Machine learning for these features.

It can manage a huge amount of real-time information. **Reducing the mental stress** that people with VI have when they travel.

Quickly process information and respond to users in a timely manner. **Making up for the problem of weak information collection capabilities** caused by visual deficiencies.

**Machine learning has memory** and can record user-specific travel preferences, resulting in more accurate and time-sensitive plans.
The users want to access reliable weather data and get suggestions about trip plan and relevant tips based on the impact the weather has on users’ navigation experience.

**Dataset training needs**
- **Set of travel plan** that users used and liked
- **Users’ behaviors** in special weather situation.

**System Learning**
- **Patterns** of the influence caused by weather around choosing recommendation plan

**ML System**

**Users Actions**
- User go to work using the navigation plan based on recommendation and get prepared with the weather information beforehand

**Evaluation of each routes** that google map provides to users based on weather information

**Possible suggestions** for users to get ready for navigating in some special weather occasions.
### Key features & key Labels

<table>
<thead>
<tr>
<th>User ID</th>
<th>Temperature</th>
<th>Rainfall</th>
<th>Snowfall</th>
<th>Ridership</th>
<th>Time of transfer</th>
<th>Time of wait</th>
<th>Include outside transfer</th>
<th>Satisfaction</th>
</tr>
</thead>
<tbody>
<tr>
<td>L3S98NM</td>
<td>71</td>
<td>1.3mm</td>
<td>0mm</td>
<td>2088</td>
<td>1</td>
<td>3min</td>
<td>Yes</td>
<td>high</td>
</tr>
<tr>
<td>NM19SOL</td>
<td>22</td>
<td>4.3mm</td>
<td>3mm</td>
<td>7603</td>
<td>15min</td>
<td>17min</td>
<td>Yes</td>
<td>low</td>
</tr>
<tr>
<td>S34LW7B</td>
<td>89</td>
<td>0mm</td>
<td>0mm</td>
<td>3405</td>
<td>7min</td>
<td>3min</td>
<td>No</td>
<td>high</td>
</tr>
</tbody>
</table>
The users want to get to know more about the situation of specific transit vehicles so that they are able to make the choices based on their own preferences.

**Dataset training needs**

Set of solutions (new routes/reactions) users will have when they pump into unexpected changes in the real-world during rush hours.

**Input**

ML System

**Output**

- Recommended new plan/routes with improved experience
- Reminder(information) of possible unexpected upcoming changes on users’ existing route

**Users Actions**

The users arrive their destinations on time safely and comfortably.

**System Learning**

Patterns of users’ reactions/feedback to the recommended plan/routes and information.
### Key features & key Labels

<table>
<thead>
<tr>
<th>EXAMPLES</th>
<th>Bus ID</th>
<th>Capacity/ridership</th>
<th>Bus/train number</th>
<th>Delay</th>
<th>Safety issue history record</th>
<th>Accessibility</th>
<th>Hygiene</th>
<th>Needs to give suggestion and make another choice</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>AV234DB</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>High</td>
</tr>
<tr>
<td></td>
<td>SD138VC</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Medium</td>
</tr>
<tr>
<td></td>
<td>BN746SK</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Low</td>
</tr>
</tbody>
</table>

**LABELS**

- High
- Medium
- Low
ANDY

Attorney whose office is located in Michigan ave. Chicago.

Living in Glenview, the suburb of Chicago City
With wife and kids

Lost vision long time ago, already get used to blind life

Hearing is impaired as well

Daily work is from 9am - 5pm in Downtown

Sometimes need to visit other places for cases

Most of time, he uses white cane and his guide dog - Lance to navigate his trip
Scenario 1

Comments from Ryan
UI - remind people where the recommendation comes from - have a very light weight where this recommendation comes from (for andy)
everytime he is trying to use app to navigate - “in bad weather, some users prefer to stick to one mode …”
Comments from Ryan

Want the person do that every morning - so machine learning can understand the pattern - it’s hard to collect real-time data from people on the bus.

“You can take the 29, but it’s little bit crowded”

Have the risk to collect real-time data from people consistently …

- So the difference is the data from different resources -(collecting from people/ or existing database
- How the data is collected..from camera, from people, from other sensors..?
Senario 3

Comments from Ryan
The things to trigger the plan should come from the human labelers ...

Triggered form machine learning - there is a barrier in taking solution 1, also a huger advantage in solution 2, so nudge andy to go to the second solution

In this case, people will go to another plan because of some attributes compared to some other attributes - and system learn that first attribute more likely can be a trigger

Start Nav + for daily commute
Workday, Andy left home at 8 o’clock as usual. He opened Nav +, chose his daily navigation plan, and follow the voice guide to his office.

Receive alarm
But when he hope off metran train and try to transfer to bus, he got the alarm from Nav + that told him the bus he would ride got into traffic incident and next bus will be delay for a hour.

Receive new plan
At the same time, he received a new adjusted plan to direct him to his office on time

Confirm and transfer to new plan
He think it makes sense so he transfer to another plan.
User interface flow
Appendix
A personalized navigation plan constructor to support people with visual impairments in workdays
The intense traffic situation in workday is not friendly for people with visual impairment.

Is it possible to leverage AI to ease the burden for them during daily commute?
More than **7.5 million Americans** are blind or have low vision.

44.2% of people who are blind are employed, they are supporting families and rising children just like people without disabilities.

10% are unemployed.

Why is navigation essential in scenario of Work for people with visual impairments.

Working is a really specific scenario, the requirements of the **time schedule** and **right navigation** are more strict, compared to casual trip in everyday life.
USER NEEDS
How might we support users with a specific and considerate plan before trip so that they can stick to their work schedule?

AI can improve this problem by

- Generating possible plans based on user’s visual impairment situation and living environments
- Offering details of each steps of plan to users when they are navigating in the real world
  - Bus routes
  - Train routes
  - The arrival time of bus/train
  - Etc...
- ...
How can NavtoWork learn the necessary information to generate considerate plan before go out

- We can get predict weather information from “The Weather Channel”
- We can get predict event alert which will happen near your routes from “Chicago Data Portal”
- We can get noise level information from “Chicago Data Portal” and make prediction.
- We can get traffic situation information from “Google map” and make prediction

https://weather.com
https://data.cityofchicago.org/
Our AI model will be optimized for precision because we would like to secure the user journey to decrease the randomness for people with visual impairments.

We understand that the tradeoff for choosing this method means our model will have less possibilities to prepare multiple alternatives as backup plans.

Reward function

Generate navigation plan for users when they try to go somewhere unfamiliar for work related purpose

Prediction

<table>
<thead>
<tr>
<th>Reference</th>
<th>Positive</th>
<th>Negative</th>
</tr>
</thead>
<tbody>
<tr>
<td>Positive</td>
<td>True Positive</td>
<td>False Negative</td>
</tr>
<tr>
<td>AI model suggests the multiple plans that guide users to their office on time</td>
<td>AI model didn't suggest the plans that guide users to their office on time</td>
<td></td>
</tr>
<tr>
<td>Negative</td>
<td>False Positive</td>
<td>True Negative</td>
</tr>
<tr>
<td>AI model suggests the multiple plans includes the ones misguide users to other places and cost extra time</td>
<td>AI model didn't suggest the multiple plans includes the ones misguide users to other places and cost extra time</td>
<td></td>
</tr>
</tbody>
</table>
How might we enable users to handle the various unexpected changes in rush hours via a more flexible plan?

**AI can improve this problem by**

- Collecting the day to day changes of accessibility services in the routes during rush hours
- Reflecting the impact of weather changes on routes and plans in real time
- Measuring the accessibility level of the possible routes offered in plan daily and adjust plans based on the results
  - Noise level at bus stop
  - Ridership & people flow in train station
  - Etc.
- Connecting users to the people who can offer real time support
- ...
How can **NavtoWork** learn the necessary information to adjust the plan during the navigation

- We can get real-time safety alert of incidents happening near your routes from “citizen”/“Chicago Data Portal”
- We can get real-time information of the flow of pedestrian from “Chicago Data Portal”
- We can get real-time traffic situation information from “Google map”
- We can get real-time noise level from “Chicago Data Portal”
**Reward function**

During the navigation process, according to real-time data changes, our AI model adjusts the navigation plan in time to ensure users can arrive to work safely, comfortably and punctually.

or give some pre-alarm to users to increase their awareness of their surroundings.

Our AI model will be optimized for precision because we would like to collect multiple information and enable users has the ability to choose the safer, more comfortable way to go to work.

We understand that the tradeoff for choosing this method means our model will not give a lot options for users and they may not stick with the same trip even it is the same destination.

<table>
<thead>
<tr>
<th>Reference</th>
<th>Prediction</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Positive</strong></td>
<td><strong>Negative</strong></td>
</tr>
<tr>
<td>True Positive</td>
<td>False Negative</td>
</tr>
<tr>
<td>AI model adjust the plan based on the information of real-time changes that potentially affect the safety/punctuality of their trip</td>
<td>AI model didn’t adjust plan based on the information of real-time changes that potentially affect the safety/punctuality of their trip</td>
</tr>
<tr>
<td>False Positive</td>
<td>True Negative</td>
</tr>
<tr>
<td>AI model adjust the plan based on the information of all possible changes in their trip</td>
<td>AI model didn’t adjust the plan based on the information of changes that doesn’t affect the safety/punctuality of their trip</td>
</tr>
</tbody>
</table>
DATA COLLECTION
From user needs to datasets
### Feature 1:
**Generate considerate plan for people with VI**

<table>
<thead>
<tr>
<th>Users</th>
<th>People with visual impairments (especially people with low vision &amp; blindness) who need to commute to work.</th>
</tr>
</thead>
<tbody>
<tr>
<td>User need</td>
<td>The users want to be able to make a considerate trip plan without stress</td>
</tr>
<tr>
<td>User action</td>
<td>User go to work using the navigation plan based on recommendation</td>
</tr>
</tbody>
</table>
| ML system output | Generation thoughtful recommendation of trip plan  
Remind user base on the schedule before they leave, make sure they can go out on time. |
| ML system learning | Patterns of the influence elements around choosing recommendation plan |
| Training dataset needed | Set of travel plan that users used, liked. |
| Key features needed in dataset | Temperature  
Rainfall  
Snowfall  
Ridership  
Time of transportation  
Duration (time cost) of waiting  
Include outside transfer |
| Key labels needed in dataset | User acceptance or rejection of plan suggestion  
User generated feedback as to why suggestion was rejected (quick survey)  
Users enjoyment rate of recommended plan |
| Data source key questions | "Where the data from? Is it correct and latest?  
"Is the recommended plan can make me go to work on time?"
### Dataset Example

<table>
<thead>
<tr>
<th>TRIP ID</th>
<th>FEATURES</th>
<th>GOOD/BAD</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>User ID</strong></td>
<td><strong>Temperature</strong></td>
</tr>
<tr>
<td></td>
<td>L3S98NM</td>
<td>71</td>
</tr>
<tr>
<td></td>
<td>NM19S0L</td>
<td>22</td>
</tr>
<tr>
<td></td>
<td>S34LW7B</td>
<td>89</td>
</tr>
</tbody>
</table>

**Data source**

**Existing dataset**

- [https://weather.com](https://weather.com)
- [https://data.cityofchicago.org](https://data.cityofchicago.org/)

**Analyze Boston**

**Feature 2:**

Empower the ability of handling the various unexpected changes for people with VI

<table>
<thead>
<tr>
<th>Users</th>
<th>People with visual impairments (especially people with low vision &amp; blindness) in rush hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>User need</td>
<td>The users want to be able to handle the various unexpected changes in rush hours</td>
</tr>
<tr>
<td>User action</td>
<td>The users arrive their destinations on time safely and comfortably.</td>
</tr>
<tr>
<td>ML system output</td>
<td>Recommended new plan/routes with improved experience</td>
</tr>
<tr>
<td>ML</td>
<td>Reminder(information) of possible unexpected upcoming changes on users' existing route</td>
</tr>
<tr>
<td>ML system learning</td>
<td>Patterns of users' reactions/feedback to the recommended plan/routes and information</td>
</tr>
<tr>
<td>Training dataset needed</td>
<td>Set of solutions (new routes/reactions) users will have when they pump into unexpected changes in the real-world during rush hours</td>
</tr>
<tr>
<td>Key features needed in dataset</td>
<td>distance to ongoing event (parade, protest, etc.)</td>
</tr>
<tr>
<td></td>
<td>noise level</td>
</tr>
<tr>
<td></td>
<td>ridership</td>
</tr>
<tr>
<td></td>
<td>Pedestrian volume</td>
</tr>
<tr>
<td></td>
<td>traffic information-delay(mins)</td>
</tr>
<tr>
<td>Key labels needed in dataset</td>
<td>users reject/accept the recommended new routes,</td>
</tr>
<tr>
<td></td>
<td>users reject/accept the pre-informed information of real-time changes,</td>
</tr>
<tr>
<td></td>
<td>users rating for routes (if changed)</td>
</tr>
<tr>
<td></td>
<td>User generated feedback as to why suggestion was rejected(quick survey)</td>
</tr>
<tr>
<td>Data source key questions</td>
<td>&quot;How can the app know the real-time changes in my surroundings?&quot;</td>
</tr>
<tr>
<td></td>
<td>&quot;Where does the new suggested alternative plans come from?&quot;</td>
</tr>
<tr>
<td></td>
<td>&quot;How certain is the app in its recommendation?&quot;</td>
</tr>
</tbody>
</table>
# Dataset Example

## FEATURES

<table>
<thead>
<tr>
<th>User ID</th>
<th>Distance to ongoing event (parade, protest, etc.)</th>
<th>Noise level</th>
<th>Pedestrian volume (depending on specific location)</th>
<th>Bus/train Delay</th>
<th>Traffic jam/car crash/ etc.</th>
<th>Needs for new recommendation</th>
</tr>
</thead>
<tbody>
<tr>
<td>AV234DB</td>
<td>1.52 km</td>
<td>73 db</td>
<td>1,290 - N Michigan ave</td>
<td>23 mins</td>
<td>yes</td>
<td>Medium</td>
</tr>
<tr>
<td>SD138VC</td>
<td>0.47 km</td>
<td>85 db</td>
<td>13,290 - S Michigan ave</td>
<td>2 hrs</td>
<td>yes</td>
<td>High</td>
</tr>
<tr>
<td>BN746SK</td>
<td>0.93 km</td>
<td>46 db</td>
<td>190 - W Madison st</td>
<td>3 mins</td>
<td>no</td>
<td>Low</td>
</tr>
</tbody>
</table>

## Data source

**Existing dataset**

- [https://abc7chicago.com/traffic/](https://abc7chicago.com/traffic/)
- [https://citizen.com/](https://citizen.com/)
- [https://data.cityofchicago.org/](https://data.cityofchicago.org/)
Design for your raters
Who are your raters?

Target raters
Our users (People with VI who has difficulty to achieve the work, study or activity that ordinary people can do)

Resources of Potential bias
The experience described by users is abstract
Their symptoms limits their experience and perspectives

What is their context and incentive?

Context (?)
After the raters finish a trip?

Incentive
Help people with visual impairments
Improve their daily trip experience.

Potential risks
Boredom of explaining experience, Incorrection of abstract information
What tools are they using?

(In-product)

**Easy to input**
Raters can just pick the answer without texting

**Avoid abstract description**
Using questionnaire interaction to help raters decompose abstract information into specific data

(Specialized)

**Quick survey**
Will using 7-8 min to finish all the questions

**Logic flowchart**
Raters will not answer the questions which is not related their experience
What we thought:

Based on what we had now and the time we have, we would like to iterate our Need 1 and Need 2 to specify them into a detailed scenario and build some add-on functions/services on the existing google products.

https://www.blog.google/products/maps/better-maps-for-people-with-vision-impairments/

Our scope:

Google had launched a service for people with visual impairment last year.

We would like to reconstruct our scope similar to what google did, like an add-on service.
<table>
<thead>
<tr>
<th>Feature</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Talkback</td>
<td>Single tap to pause&lt;br&gt;“L” shape for global context menu&lt;br&gt;Upside down “L” for local context menu</td>
</tr>
<tr>
<td>Google Lookout</td>
<td>Pixel, LG, Samsung&lt;br&gt;Free&lt;br&gt;Put down the phone to finish the function;&lt;br&gt;Take a picture and let the device describe;</td>
</tr>
<tr>
<td>Seeing AI</td>
<td>Identification (iOS)&lt;br&gt;Free&lt;br&gt;Swipe up and down to “circle” through the options</td>
</tr>
<tr>
<td>Blindsquare Navigation</td>
<td>Navigation (iOS)&lt;br&gt;40&lt;br&gt;Set filter to hear information you need</td>
</tr>
</tbody>
</table>
Team Members

- Mridula Dasari
- Sze Wing Alpha Wong
- Nanxi Yu
- Minyi Zhang
Walking ...
101 reasons not to walk

I don’t have time for it
I don’t think it’s safe
I think it’s tedious

......
Walking home, or walking on eggshells

“37% of pedestrians feel unsafe while walking even a mile”
Barrier 2

Sorry, Apps are not optimized for walking

“Current navigation apps are optimized for driving more than walking”
Barrier 3

I think walking takes too long

“About 73% of people incorrectly estimated walking time.”

“U.S. commuters wait approximately 40 mins a day for public transit.”
Walker 4

Walking is boring and not cool

“25-35% of American adults are completely inactive”

“83% of U.S. Adults Drive Frequently”

“Walking is for poor people”
101 reason to walk
A great cardio exercise
Keeps the body healthy
Helps with mental stress
Improves cognitive ability
......
Walking is good, but we don’t walk enough

Walking **cuts the risk of dying by 32%;**

Average American walks 3-4k steps a day, while **10k** is recommended
HMW encourage people to walk more in order to stay healthy by addressing their personal considerations related to safety, enjoyment and much more?
User Needs Hierarchy

Well-being as a overall theme
Aspects of well-being in different layers of human needs

Safety
- Personal Security
- Environment Safety

Enjoyment
- Mental Pleasure
- Social Connection

Esteem
- Sense of Achievement

Walking as a Better Choice
- Fit into people’s daily schedule
- Goal setting and progress tracking
- Walk for tangible benefits

Walk for Fun
- Better scenery
- Interest places to explore
- Meet with people in common

Walk with Confidence
- Low risk area
- Access to help
- Better lighting
- Less hurdles
- Easier wayfinding

HMW help users to meet their needs
New Normal Master Challenge

Chih Yuan (Hugo) Hsiao, Chunxuan (Kelvin) Yu, Siwei Sun, Yutian Sun,
Master Challenge - Project Description

Name of organization/department

New Normal Master Challenge

Project purpose:

Explore what kind of digital social product we can provide under the post COVID-25

Details of project/intended outcomes

Design a near-future conceptual product centered on Hologram + Haptic glove + Drone to improve the experience of young adults giving them the ability to reduce their loneliness and enhance their connection to the real world through traveling.
Media
Learning experience

John leads us to walk through the whole process of making a product. From a big scale like scenario planning which helped us defined how the product should look like in several possible futures to details like technology use and using the scenario. We all agreed it’s very useful and gave us more understanding of “post-human centered design” and “speculative design”.
THE SITUATION

THE CUSTOMER & THEIR NEEDS

THE SOLUTION

THE BENEFITS

THE UNINTENDED CONSEQUENCES

Q & A
The Situation

In 2023, COVID-19 strikes a fourteenth wave in a row since the global outbreak in 2019. People already adapted to the new working from home normal.
The WFH shapes the people and they start to embrace new technologies in the digital era, and value community more than ever.
The young who can’t bare the isolation anymore tried to ignore the risk and gathering together for clubbing or events. As a result, positive cases are increasing dramatically.
The society has been seeking a way out from the economic shutdown that complement the entertaining aspect of people’s lives. People need to unite together, be together...
The Customer & Their Needs

For young clubbers who regard clubbing as a way of **socializing**, **showing identity**, and **releasing stress**, they are looking for a contactless clubbing solution that can:

- Keep social distance
- Feel closer to people
- Authentic club culture
- More modes of interaction
1st Ideation - Mixxy, a Virtual Club Platform

Research & Decide → Prepare → Entry → Drink → Dance → Leave & Share
Socializing

Buy drinks for others
Play drink games
Toast
Making new friends while drinking together

Drinking

Order drinks
Taste various beverage
Drink for warm-up
Feel tipsy

Dancing

Drink while dancing
Their Desires & Frustrations During Drinking

<table>
<thead>
<tr>
<th>Desires</th>
<th>Frustrations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Health &amp; Safety Concerns</td>
<td>Limited interaction&lt;br&gt;No physical contact, feel distant with friends&lt;br&gt;No small group chat in a large scale video chat&lt;br&gt;Limited channel to meet new friends&lt;br&gt;Hard to find alternatives channels(social, music...)&lt;br&gt;No cultural vibe&lt;br&gt;Poor atmosphere</td>
</tr>
<tr>
<td>Emotional feelings</td>
<td>Complicated process ordering alcohol delivery&lt;br&gt;No more fancy-looking drinks</td>
</tr>
<tr>
<td>Sensory feelings</td>
<td>Cyber drinking experience&lt;br&gt;Meet people who have similar hobbies/taste&lt;br&gt;Have fancy effect&lt;br&gt;More interaction activities with friends&lt;br&gt;Feel the amazing effect of the club&lt;br&gt;Amazing club experience&lt;br&gt;Enjoy music of certain genre</td>
</tr>
<tr>
<td>Drink quality</td>
<td>Economic&lt;br&gt;Cheap price&lt;br&gt;Without traveling</td>
</tr>
<tr>
<td>Social function enhancement</td>
<td>Fun DIY beverage&lt;br&gt;Customized service</td>
</tr>
</tbody>
</table>
HMW provide a contactless and safe way of clubbing for people in the new normal of a post-COVID world so that they can experience in-club drinking to stay connected with people and enjoy themselves?
The basic equipment owned by users to provide immersive experience for them which engaged the visual sense, smell, hearing and haptic.

The core application (pc\mobile\mr headset) allows users to engage the service including browsing the clubs, joining the event, dancing or drinking in the club, etc. All digital experiences are provided by the platform.

A channel to provide offline service for the users. Users purchase the ticket, order the beverage and accessory on the virtual platform or the website. They receive the physical package including the beverage, Mixxy glass and other AR accessories.

Exclusive drinks from the club with the advanced features in the virtual club.

Multi-sensational glass to enhance the virtual drinking experience.

AR decorations for users’ home interior which brings the club to their home.
Meet JD

Joel Douglas

Age: 26    Location: San Francisco    Occupation: Software Engineer

JD loves playing video games and is willing to know new friends in digital world. After graduating from college, he becomes a software developer, while his best friends work in different cities all around the world.

Now he really wants to hang out with them as usual, drinking, talking and dancing freely not only to release stress but also to get rid of being lonely.

Recently his best friend invited him to a brand new virtual club. For the best experience of having fun, he was also suggested to buy the full package of the ticket.

JD’s party night is about to begin...
A Story of JD

**Unboxing**
- The beverage
- The glass
- AR Accessory

**Preparation**
- Equipment Setup
- Health Monitor Setting

**Start Drinking**
- Beverage Enhancement
- Health Monitor Tracking
- Order for friends

**Party Climax**
- Virtual Toast
- Premium Dizziness
- Health Monitor Reminder
Unboxing
The beverage
The glass

Preparation | Start Drinking | Party Climax
Unboxing
The beverage
The glass

Preparation  Start Drinking  Party Climax

Low Volume Mode

High Volume Mode
Unboxing
Preparation
Equipment Setup
Health Monitor Setting

Start Drinking
Party Climax
Do you want to set a threshold to your drinking for the benefit of your health tonight?

Create New

Use Last time's Setting
Unboxing

Preparation

Start Drinking

Beverage Enhancement
Health Monitor Tracking
Order for Friends

Party Climax
Start Drinking
Beverage Enhancement
Health Monitor Tracking
Order for Friends

Unboxing
Preparation

REALITY

VIRTUAL
REALITY

Blowing Port

Breath Alcohol Test Port

IR Sensor

Start Drinking
Beverage Enhancement
Health Monitor Tracking
Order for Friends

Unboxing
Preparation
Party Climax
Unboxing

Preparation

Start Drinking
- Beverage Enhancement
- Health Monitor Tracking
- Order for Friends

Party Climax
Saturday Special List

Start Drinking
Beverage Enhancement
Health Monitor Tracking
Order for Friends

Unboxing
Preparation
Party Climax
Unboxing
Preparation

Start Drinking
Beverage Enhancement
Health Monitor Tracking
Order for Friends

Party Climax
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**Party Climax**

- Virtual Toast
- Premium Dizziness
- Health Monitor Reminder
You are about to enter **Premium Dizziness** in 10 seconds.

It’s an additional service of the drinking package.

You can exit any time by pointing here for 3 seconds.
Party Climax
Virtual Toast
Premium Dizziness
Health Monitor Reminder
Maybe slow down a little bit? I saw you're almost at the limit you set.
Setting demos

SYNC at the beginning

Using WebCam or cameras on smartphone to track player’s body, movement and facial expression so that clubber can have a “real” avatar in the system.

Move in Virtual world

How to explore the Virtual Club in a common living room? The Mixed Reality system combined with camera can let players move without really walking around.
Drink Virtually

Facing a screen to drink is kind of awkward currently, but with the help of haptic feedback comes from the Mixxy Glass and the special visual effects, clubbers can drink virtually in the reality.

Premium Dizziness Effects

When the clubber gets tipsy, Premium Dizziness included in the drinking package will provide several visual effects to make the clubber stand out in the virtual world. On-fire, Speedy, Flying, etc.
For young people living in the post-COVID world
Who seek authentic drinking and clubbing experience while keeping the social distance.
We provide Mixxy, a MR-based virtual clubbing service and delivery service which includes our dedicated smart glass
That help clubbers feel the authentic club culture and stay connected with people in their favorite club environment
Unlike the awkward Zoom clubbing or in-person clubbing that risks life
We offer an immersive and multi-sensorial enhanced experience to provide various modes of interactions between people while keeping them safe at home
Unintended Consequences

**Online Fraud**

In a highly immersive digital environment, people can utilize their fraudulent avatars to make others believe they are someone they are actually not. Especially in a club environment, it’s possible there will have people hired by the club to lure you into buying more drinks.

**Privacy Issue**

Even with the privacy settings, it’s inevitable that some people may expose their vulnerability when they are drunk and get exploited by people with bad intentions. It may also cause social awkwardness when being over transparent about how drunk they are between friends.

**Disturbing Noise**

Without a dedicated, usually belowground club space, it can be too noisy and disturbing to the neighborhood when people are having fun dancing and drinking at home.
Q & A

Thank you!