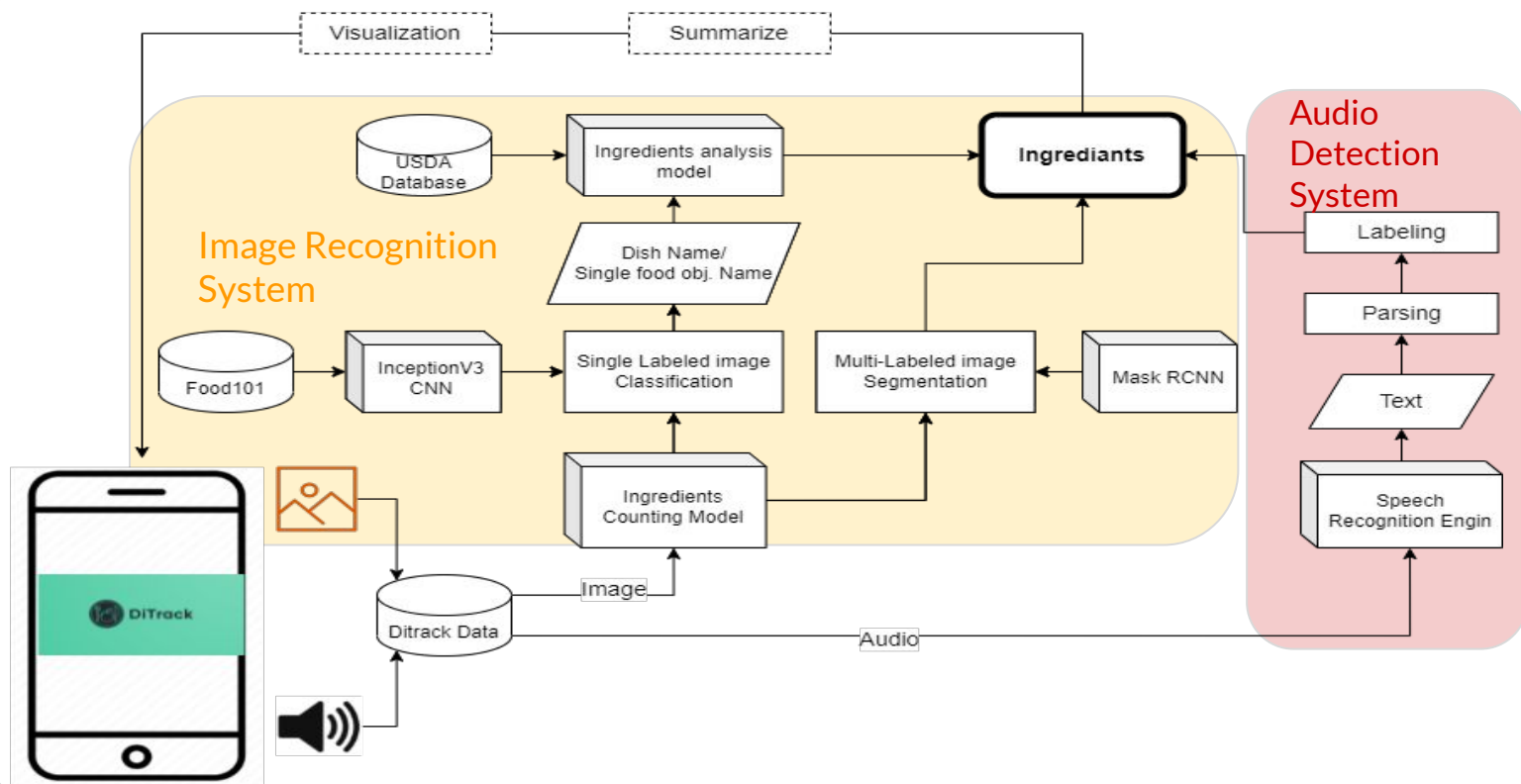


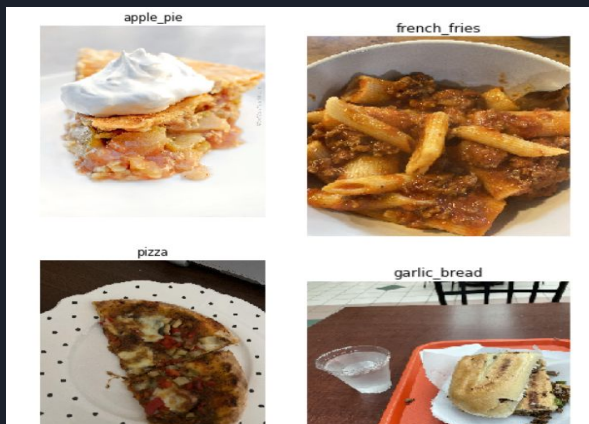
# Smart Nutrient and Diet Monitoring for IBD Literature Research (Spring/Summer Term)

Xinhang(Lewis) Li

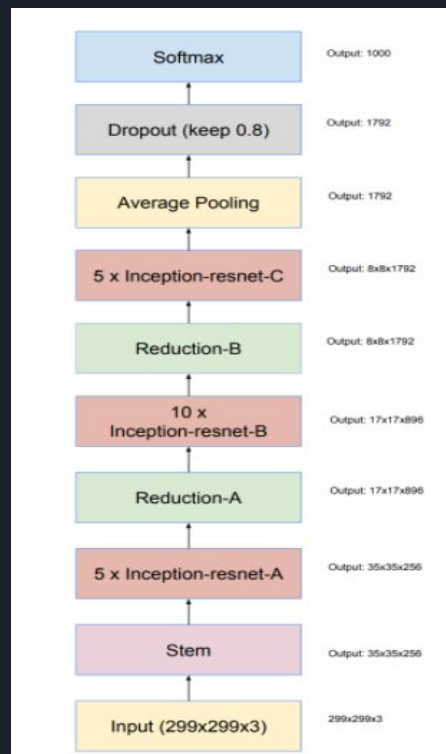
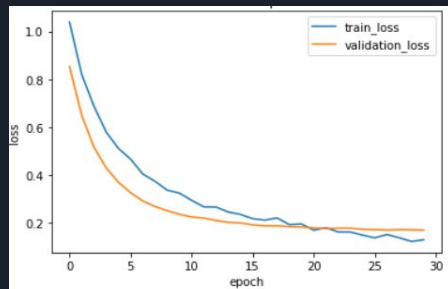
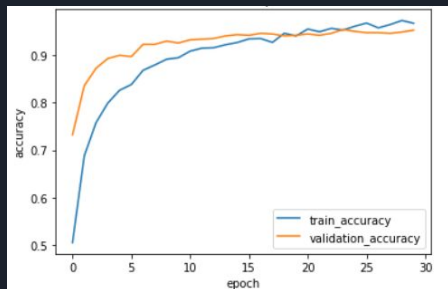
# Algorithm System Design



# Single labeled image Recognition



- Supervised Classification model
- Trained with Dataset food101
- Test with data from food101 and DiTrack
- Accuracy over 95%
- For real use may need large amount of target value
- Only applied to image with single food object



InceptionV3 Model

# Sementic Segmentation Algorithm

Sementic Segmentation also requires a training dataset which has enough training images and the segmented version.

Our current data from DiTrack is not big enough to fulfill the training purpose. Some ingredient classes don't have more then one image.

Foodseg103 (7118 images with 104 ingredient classes)





# Firestore to MySQL

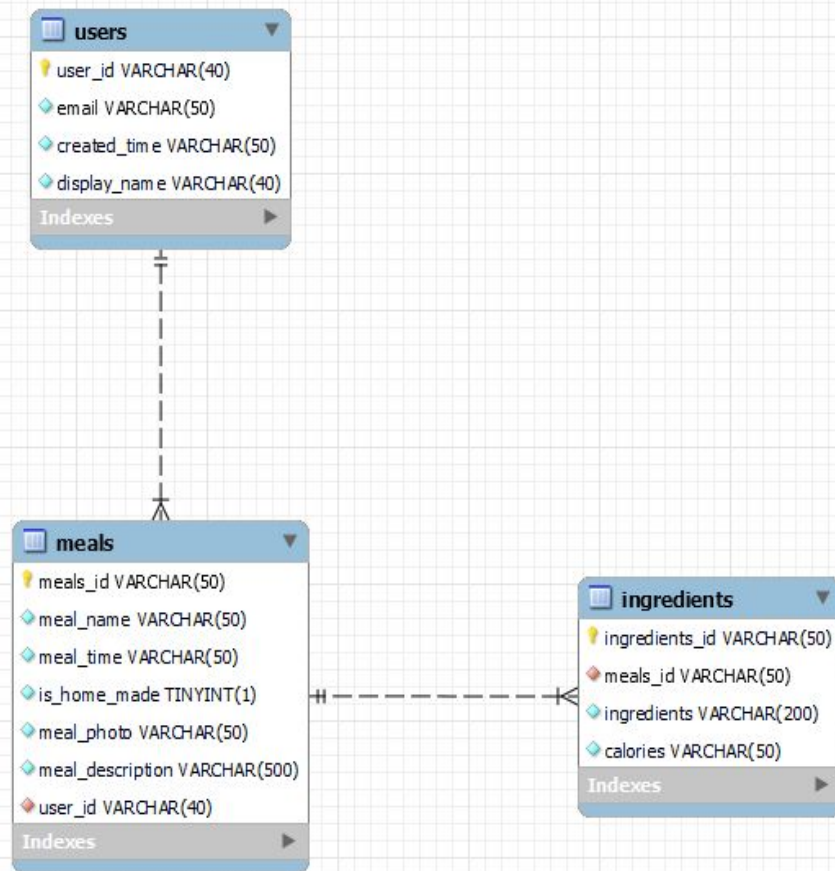
Firestore store the data with non relational database. SQL database is relational database. There is no direct way to finish the data migration, several step shall be process to build our local SQL database.

- Create a SQL database with inner relation
- Export data from Firestore using API
- Modify the Json file
- import the Json file into localhost

## Database Structure

- 3 Tables
  - Collected Data: Users and Meals
  - Analyzed Data: ingredients
- 
- Inner relationships
  - Every Users has multiple meals
    - Linked through foreign key user\_id

```
CREATE TABLE `users` (  
  `user_id` varchar(40) NOT NULL,  
  `email` varchar(50) NOT NULL,  
  `created_time` varchar(50) NOT NULL,  
  `display_name` varchar(40) NOT NULL,  
  PRIMARY KEY (`user_id`)  
) ENGINE=InnoDB DEFAULT CHARSET=utf8mb4 COLLATE=utf8mb4_0900_ai_ci;  
  
CREATE TABLE `meals` (  
  `meals_id` varchar(50) NOT NULL,  
  `meal_name` varchar(50) NOT NULL,  
  `meal_time` varchar(50) NOT NULL,  
  `is_home_made` boolean not null default 1,  
  `meal_photo` varchar(5000) NOT NULL,  
  `meal_description` varchar(2000) DEFAULT 'NONE',  
  `user_id` varchar(40) NOT NULL,  
  PRIMARY KEY (`meals_id`),  
  CONSTRAINT `user_id` FOREIGN KEY (`user_id`) REFERENCES `users` (`user_id`)  
) ENGINE=InnoDB AUTO_INCREMENT=5 DEFAULT CHARSET=utf8mb4 COLLATE=utf8mb4_0900_ai_ci;
```





# export data from firebase

## Get API key

- Cloud Firestore-> Project Overview-> Project Settings ->Service Account  
->Generate new private key(Node.js)

## Install npm package node-firestore-import-export in CMD

- `npm install -g node-firestore-import-export`

## Export data (CMD)

- `firestore-export -a (APIkey path) -b (json file path) -p`

# python sql connector

pip install mysql-connector-python

Use python to modify the json file into the format which can be recognised by MySQL.

```
[{'meals_id': '03US3Ht1f00rbRbInZA5',  
  'meal_name': '',  
  'meal_time': datetime.datetime(2022, 3, 29, 14, 5, 39),  
  'is_home_made': 0,  
  'meal_photo': 'https://firebasestorage.googleapis.com/v0/b/ditrack.appspot.com/o/users%2Fpt1U0U0jjHhVKnAlu0HbU5QrKv1%2Fuploads%2F1648577196076423.jpg?alt=media&token=aed8dd05-f975-420b-9183-e5afa0094161',  
  'meal_description': '2 Quaker tomato and basil rice cakes with cottage cheese on top. 1 Quaker caramel chocolate chip rice cake with peanut butter on top. 1 tangerine',  
  'user_id': 'pt1U0U0jjHhVKnAlu0HbU5QrKv1',  
  {'meals_id': '0EQb1TQpd5IgWz9P3Ncx',  
    'meal_name': 'dinner',  
    'meal_time': datetime.datetime(2022, 4, 3, 18, 38, 49),  
    'is_home_made': 0,  
    'meal_photo': 'https://firebasestorage.googleapis.com/v0/b/ditrack.appspot.com/o/users%2FHjZHoLZFhgafvSSXbGtwyA2jNgS2%2Fuploads%2F1649025524996948.jpg?alt=media&token=9dbce0c1-02b3-46bd-887c-f8def90f01f5',  
    'meal_description': 'French toast topped with lux and cream cheese',  
    'user_id': 'HjZHoLZFhgafvSSXbGtwyA2jNgS2'}],
```

```
mealsImport = []  
for x,y in meals.items():  
    dic={}  
    dic['meals_id']=x  
    dic['meal_name']=y['meal_name']  
    dic['meal_time']=datetime.fromtimestamp(y['meal_time']['value']['_seconds'])  
    if y['is_home_made']==True:  
        dic['is_home_made']=1  
    else:  
        dic['is_home_made']=0  
    dic['meal_photo']=y['meal_photo']  
    dic['meal_description']=y['meal_description']  
    dic['user_id']=y['author_uid']  
  
mealsImport.append(dic)
```

```
usersImport = []  
for y in users.values():  
    dic={}  
    dic['user_id']=y['uid']  
    dic['email']=y['email']  
    dic['created_time']=y['created_time']['value']['_seconds']  
    if "display_name" in y.keys():  
        dic['display_name']=y['display_name']  
    else:  
        dic['display_name']='Anonymous'  
    usersImport.append(dic)
```

```
[{'user_id': 'ODY9dBXjfkZ9d4vGAHImXyW3fm22',  
  'email': 'prezjustin@gmail.com',  
  'created_time': 1645980387,  
  'display_name': 'Justin Prez',  
  {'user_id': '0abxt1uMPd0AJmk9stLnvfspuJwk1',  
    'email': 'ditrack.mreb-tu17@gmail.com',  
    'created_time': 1648525001,  
    'display_name': 'Anonymous',  
    'user_id': '1g7e71FwZ2NzqTYD0BLsSiV9q7Y2',  
    'email': 'ditrack.mreb-tu3@gmail.com',  
    'created_time': 1648515596,  
    'display_name': 'Anonymous'}],
```

Preprocessed data



# Structured Data

- 25 users
- 244 meals

Result Grid	Filter Rows:	Edit:	Export/Import:
user_id	email	created_time	display_name
0abxt1uMPdOAMk9stLn...	ditrack.mreb+u17@gmail...	1648525001	Anonymous
0DY9dXBxfKZ9d4vGAHIm...	prezjustin@gmail.com	1645980387	Justin Prez
1g7e71FwZ2NzQTYD0BL...	ditrack.mreb+u3@gmail.c...	1648515596	Anonymous
1wa5pywiswVml3vBPdY...	ditrack.mreb+u5@gmail.c...	1648559953	Anonymous
6AE8SAajVzV43097EPv7...	ditrack.mreb+u12@gmail...	1648524885	Anonymous
7C5zBSER28SMou9kmF...	michaelzon7@gmail.com	1646070493	Michael Zon
7qIPjpy3smYPBvT7vPvT...	arjunjagota7@gmail.com	1646078288	Arjun Jagota
BHK5jYmKRIRE6PWOAV...	qiyingfang@gmail.com	1646070633	Qiyin Fang
DGi8ZM4U66cfvCOUWU8D...	ditrack.mreb+u16@gmail...	1648524523	Anonymous
dMpEZp8STPcJBhL6Ik9u...	ditrack.mreb+u14@gmail...	1648583208	Anonymous
ff3ucXBuSybuHp9mQVZ...	lix225@mcmaster.ca	1646416812	Lewis
HjZHoLZFhgafvSSXbGtw...	ditrack.mreb+u9@gmail.c...	1648517336	Anonymous
NM7ycrD0VMUsBujnL7W...	harshilmodi08@gmail.com	1645989145	Harshil Modi
OtKctM8qo6Y4V8yxu7Sf...	ditrack.mreb+u15@gmail...	1648648664	Anonymous
oX3i2hW9YPQXvwmsBE5...	ditrack.mreb+u19@gmail...	1648562079	Anonymous
pt1UUOjjHhVKnAluDOHb...	ditrack.mreb+u6@gmail.c...	1648524736	Anonymous
qCPzZWWhZidQEDaT6Zk8...	ditrack.mreb+u8@gmail.c...	1648516927	Anonymous
rboVZwvGNWU2zM7Axc...	seilerc900@gmail.com	1649086202	seilerd
rv0l4IMkJNMe89sFR3JIP...	ditrack.mreb+u2@gmail.c...	1648527287	Anonymous
RzndHxVuzFggNLkF2zEn...	ditrack.mreb+u10@gmail...	1648580765	Anonymous
sJ8WUXMHw7dd4tdKDd...	ditrack.mreb+u11@gmail...	1648560855	Anonymous
uhIm1ldyztPEtJ1WQ1F8...	ditrack.mreb+u18@gmail...	1648560837	Anonymous
vv9gXos3YoTvEsnRaDQ...	ditrack.mreb+u4@gmail.c...	1648521493	Anonymous
y5nFeMtmu0TYqBLdRY1...	ditrack.mreb+u1@gmail.c...	1648497274	Anonymous
Yi3amAineMf4qy5vnuxw...	jadynwini@hotmail.com	1646068580	Jadyn Winitzky

# Structured data

## Possible directions

- mealtime analysis
- Text analysis (NLP)

meals_id	meal_name	meal_time	is_home_made	meal_photo	meal_description	user_id
03US3Htf00rbRbImZA5		03/29/2022 14:05:39	0	https://firebasestorage.goo..	2 Quaker tomato and basil rice cakes with cottage cheese on top. 1 Quak...	t1U0OjjHhVKnAluDOHbU5QrKvv1
0EQbITQpd5IgWz9P3Ncx	dinner	04/03/2022 18:38:49	0	https://firebasestorage.goo..	French t toast with lux and cream cheese	tjZHoLZFhgafvSSxbGtwyA2jNqS2
0z6979wb8D4xAv3h0tfZ	dinner at Wilde orchard	03/04/2022 18:43:26	0	https://firebasestorage.goo..	menu	iHK5jYmkRIRE6PWOAvYlhd9ZVAE3
12t52QXAVmhgHnQyBxxp	Bagel	03/31/2022 10:41:48	1	https://firebasestorage.goo..	cinnamon raisin bagel with peanut butter and strawberries	iMpEzP8STPcJBhL6Ik9u1GGxmEW2
17JfaWQ48IAU2uj9QXA	lunch	05/07/2022 11:32:32	0	https://firebasestorage.goo..	soup	iHK5jYmkRIRE6PWOAvYlhd9ZVAE3
1iMljKjRrZr4RjSPR2lw	lunch: omelette	04/05/2022 19:03:27	0	https://firebasestorage.goo..	eggs with veggies, toast, and fruit on the side	labxt1uMPdOAMk9stLnvfspuJwk1
1oqrY5L2TEKB3LiRnJBf	breakfast: lemon pancakes	03/31/2022 14:46:31	1	https://firebasestorage.goo..	lemon poppyseed pancakes with yogurt glaze	labxt1uMPdOAMk9stLnvfspuJwk1
1wAR4rCdAGIEJlJCSF		04/04/2022 17:04:46	0	https://firebasestorage.goo..	chicken stracciatella soup	lg7e71FwZ2NzQTYD0BLs5iV9q7Y2
244QCQWsrk4Bba4fmHXQ	handful of mixed nuts	04/04/2022 11:30:31	1	https://firebasestorage.goo..	handful of mixed nuts	boV2wvGNWU2z7M7Axcokj4MH1Wv2
29dPA700D62xSL4KEkzx		03/15/2022 20:50:24	1	https://firebasestorage.goo..		iDY9dBxjfkZ9d4vGAHImXyW3fm22
2jy6lmF8DQaFnd7Qb7Jf	Egg and Bacon	02/28/2022 14:15:07	1	https://firebasestorage.goo..	eggs peameal onions mushrooms spinach and peppers.	iDY9dBxjfkZ9d4vGAHImXyW3fm22
2PHao02wRxtgm3RCJza	panini and soup	04/01/2022 19:11:45	1	https://firebasestorage.goo..	homemade paninis with butternut squash soup and	iMpEzP8STPcJBhL6Ik9u1GGxmEW2
3bqR6zmVfz912hi3XcyC		04/01/2022 16:10:59	0	https://firebasestorage.goo..	2 slices of Apolo veggie pizza	/5nFeMtmu0TYqBldRY1fpAQbipE3
3H3ohVwMQZcaUOCj80fh	Kichidi	03/31/2022 13:14:29	1	https://firebasestorage.goo..	yellow lentil and rice with plain yogurt and mango chutney	iMpEzP8STPcJBhL6Ik9u1GGxmEW2
47qUEXubYvuwixGL2rbf	Chicken on the Sticks	03/29/2022 14:23:37	0	https://firebasestorage.goo..	Fries with Shawarma chicken and garlic sauce	iX3i2hW9YPQXvwmsBE5FGFLdnqX2
4MdS2C755wcR88vCki40	Caramel Rice Cake	03/30/2022 16:50:07	0	https://firebasestorage.goo..	1 Quaker caramel chocolate chip rice cake	t1U0OjjHhVKnAluDOHbU5QrKvv1
4nqSUEfO5gZNRVoGsIrL	peameal bacon and eggs	04/02/2022 08:53:57	1	https://firebasestorage.goo..	peameal bacon, and over easy eggs	iCPZwHidZidQEDaT6Zk80MATvIE3
4VNEBNq8d7eOLiQsRAel		03/31/2022 18:51:05	0	https://firebasestorage.goo..	pastrami sandwich	i38WUXMHw7dd4tdKDdbQKxJfjVS2
54bq7ApBkCKjGEA88VFV	Snack	03/29/2022 22:49:14	0	https://firebasestorage.goo..	Greek yogurt strawberries granola	ih1ml1dyztPEtJ1WQ1F8v6OzlsK2
5BB3bEU7YvEbEk9mx0tPh	shmood	03/31/2022 23:04:23	1	https://firebasestorage.goo..	peanut butter protein powder strawberries bananas	lwa5pywiswVml3vBPdYOGsilkTT2
5PT1UVg4XQqIDYcewjuy	lunch	04/01/2022 14:33:33	1	https://firebasestorage.goo..	green beans mushrooms chicken breast	ih1ml1dyztPEtJ1WQ1F8v6OzlsK2
5Qj3TrOuB9m53fBzcZK		03/29/2022 09:36:59	0	https://firebasestorage.goo..	coffee	i38WUXMHw7dd4tdKDdbQKxJfjVS2
5UHPGwAwii6AoIewir7eO	lunch	04/06/2022 12:35:58	1	https://firebasestorage.goo..	rice with chicken and a samosa	tjZHoLZFhgafvSSxbGtwyA2jNqS2
5XN0NFCWDkdqcbqALt	ham burger	03/05/2022 21:14:10	0	https://firebasestorage.goo..	fries and onion rings	iM7yrcDOVMUUsBujnL7WmbxBfAch3



# Information form

## Direct information

- meal time Timestamp
- meal type (is homemade) Binary
- meal name string
- meal description text
- meal photo jpg png
- Audio anotation

## Extract data

- meal location (meta data from the image)
  - Restaurant name
  - Dish name
  - Nutrients information(ingredients, calories)
- meal time (meta data from the image)
  - Photo taken time
  - Meal habit (frequency)
- description (text or audio)
  - ingredient
  - portion
- meal type
  - breakfast, lunch, dinner, snack

# Data Distribution

user_id	totalmealnumber
0abxt1uMPdOAMk9stLnvfspuJwk1	11
0DY9dBXjfkZ9d4vGAHImXyW3fm22	10
1g7e71FwZ2NzQTYD0BLsSiV9q7Y2	14
1wa5pywiswVml3vBPdYOGsIlkTT2	10
7qIPjpy3smYPBvT7vPvTUQDitbX2	1
BHK5jYmKRIRE6PWOAvyLhd9ZVAE3	29
DGi8ZM4U66cfVcOWU8DoiFTpMqy2	9
dMpEZp8STPcJBhL6Ik9u1GGXmEW2	11
HjZHoLZFhgafvSSxbGtwyA2jNqS2	30
NM7ycrD0VMUsBujnL7WMbxBFaCh3	8
OtKctM8qo6Y4V8yxu7Sf1RKvjw2	2
oX3i2hW9YPQXvwmsBE5GFGldnqX2	3
pt1UuOjjHhVKnAluDOHbU5QrKvv1	4
qCPzZWWhZidQEDaT6Zk80MATvIE3	19
rboVZwvGNWUJ2zM7Axcokj4MH1Wv2	2
rv0l4IMkJNMe89sFR3JIPWwV9SS2	14
RzncHxVuzFggNLkf2zEnGdwQSBg1	3
sJ8WUXMHw7dd4tdKDdbQKxJFjVS2	21
uhIml1dyztPEtJ1WQ1F8v6OzlsK2	11
vv9gXos3YoTvEsnRaDQNBzazJsc2	5
y5nFeMtmu0TYqBLdRY1fpAQbipE3	10
Yi3amAineMf4qy5vnuxwJSPD67f2	10

Homemade

# Mealtime Analysis

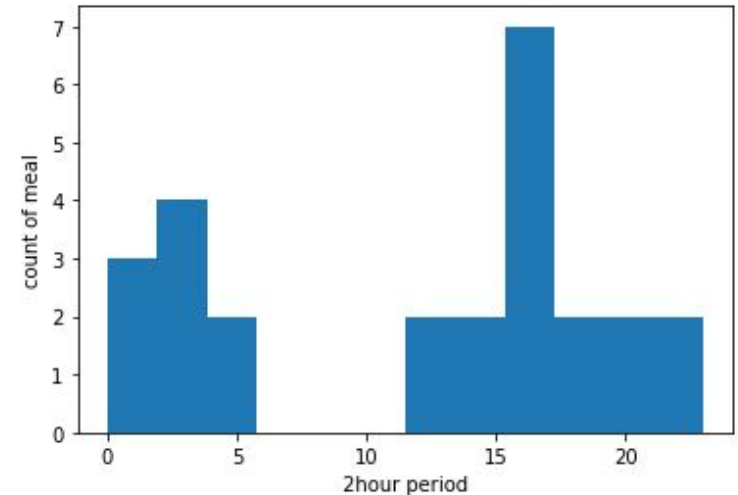
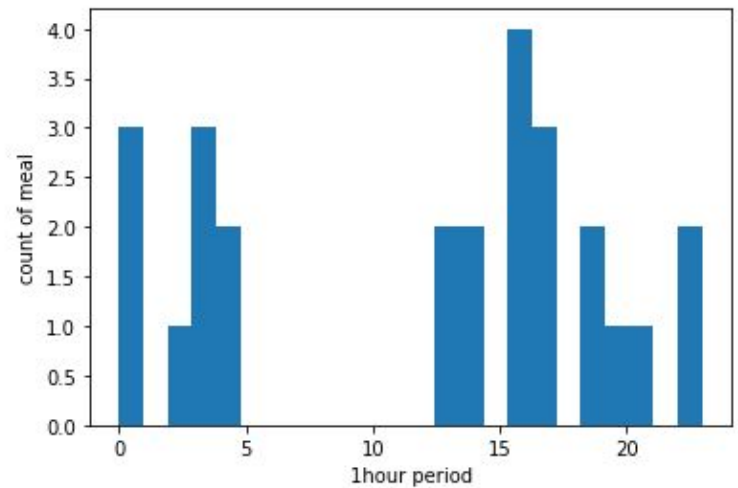
Summarize of one user's mealtime

showing there diet time habit

X-axis represent the mealtime(hour)

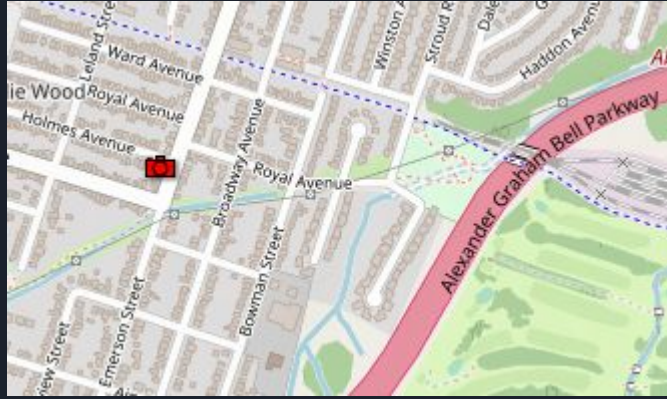
Y-axis count the meal numbers they took during this hour during a monitoring period.

e.g. User1 took 3 meals between 0:00- 1:00 during the monitoring period





# GPS Information analysis



There is no direct GPS data recorded on Firebase. So I extract some of the GPS data from the meta data of the image.



However, some of the image does not have GPS information in their meta data (due to different phone type or camera mode).



# Current Challenges regarding the database

- The current data transfer method is can not support realtime update, but it can be update by repeat the above instruction after period of time
- Image data is not stored directly
-

# Data Summary(sql query)

user_id	COUNT(*)
HjZHoLZFhgafvSSxbGtwyA2jNqS2	30
BHK5jYmKRIRE6PWOAvyLhd9ZVAE3	29
sJ8WUXMHw7dd4tdKDdbQKxJfjVS2	21
qCPzZWhZidQEDaT6Zk80MATvIE3	19
1g7e71FwZ2NzQTYD0BLsSiV9q7Y2	14
rv0l4IMkJNMe89sFR3JIPWwV9SS2	14
0abxt1uMPdOAMk9stLnvfspuJwk1	11
dMpEZp8STPcJBhL6Ik9u1GGXmEW2	11
uhIml1dyztPEtJ1WQ1F8v6OzlsK2	11
0DY9dBXjfkZ9d4vGAHImXyW3fm22	10
1wa5pywiswVml3vBPdYOgSllkTT2	10
y5nFeMtmu0TYqBLdRY1fpAQbipE3	10
Yi3amAineMf4qy5vnuxwJSPD67f2	10
DGi8ZM4U66cfvCOWU8DoiFTpMqy2	9
NM7ycrD0VMUsBujnL7WMbxBfAch3	8
vv9gXos3YoTvEsnRaDQNBzazJsc2	5
pt1UUOjjHhVKnAluDOHbU5QrKvv1	4
oX3i2hW9YPQXvwmsBE5GFGldnqX2	3
RzncHxVuzFggNLkF2zEnGdwQSBg1	3
OtkctM8qo6Y4V8yxu7Sf1RKvjw2	2
rboVZwvGNWU2zM7Axcokj4MH1Wv2	2
7qIPjpy3smYPBvT7vPvTUQDitbX2	1

- Meal numbers of each user
- Homemade summary

	is_home_made	COUNT(*)
▶	0	131
	1	106

```
1 • SELECT * FROM meals;
2
3
4 • SELECT is_home_made, COUNT(*)
5 FROM meals
6 GROUP BY is_home_made;
7
```



# Data Summary(sql query)

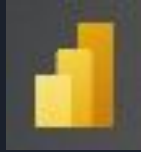
meal_time	COUNT(*)
03/30/2022 00:34:10	4
03/30/2022 02:45:04	1
04/04/2022 06:28:19	1
03/02/2022 07:52:04	6
04/02/2022 08:53:57	15
03/29/2022 09:36:59	10
03/31/2022 10:41:48	11
05/07/2022 11:32:32	18
04/06/2022 12:35:58	11
03/31/2022 13:14:29	21
03/29/2022 14:05:39	35
04/01/2022 15:37:50	12
04/01/2022 16:10:59	10
04/04/2022 17:04:46	6
04/03/2022 18:38:49	14
04/05/2022 19:03:27	26
03/15/2022 20:50:24	10
03/05/2022 21:14:10	11
03/29/2022 22:49:14	6
03/31/2022 23:04:23	9

meal frequency by hours of all users

- (breakfast)8-9 has a higher frequency
- (lunch)11-15 has a higher frequency
- (dinner)18-21 has a higher frequency

```
SELECT meal_time, COUNT(*)
FROM meals
group by substring(meal_time, 12, 2)
ORDER BY substring(meal_time, 12, 2) ASC;
```

# Data visualization

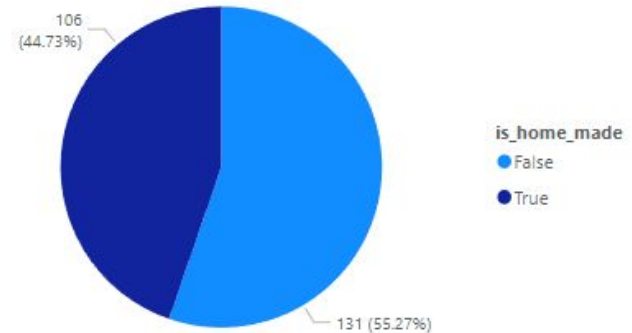


Connect the MySQL localhost to Power BI

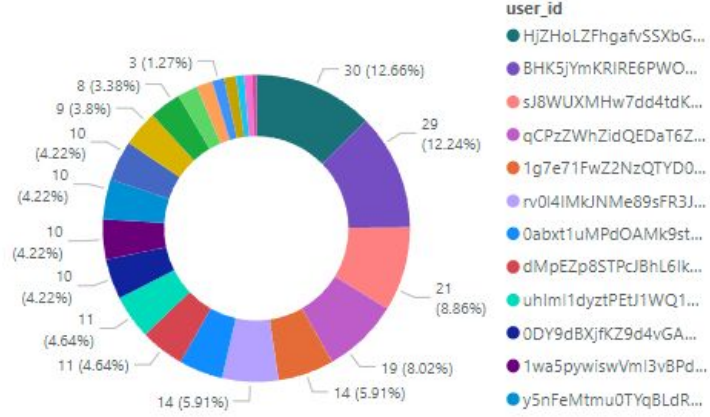
Home->Get Data->More..

mysql database

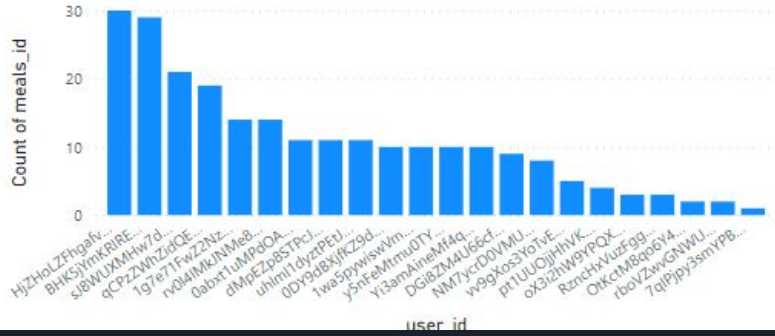
Count of is\_home\_made by is\_home\_made



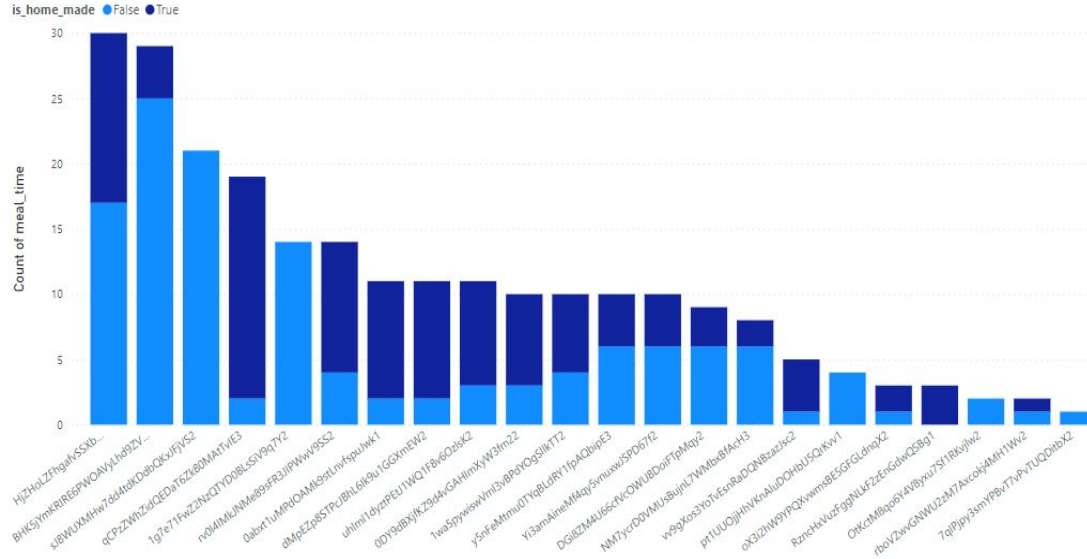
Count of meals\_id by user\_id



Count of meals\_id by user\_id



Count of meal\_time by user\_id and is\_home\_made



meals_id	meal_name	meal_description
0EQbITQpd5IgWz9P3Ncx	dinner	French t toast with lux and cream cheese
0z6979wb8D4XaV3h0tfZ	dinner at Wilde orchard	menu
12t52QXAVmhgHnQyBxxp	Bagel	cinnamon raisin bagel with peanut butter and strawberries
17JfaWQ4BIAU2uj9QXA	lunch	soup
1iMijKjRrZr4RjSPR2lw	lunch: omelette	eggs with veggies, toast, and fruit on the side
1oqrY5L2TEKB3LlrNJBF	breakfast: lemon pancakes	lemon poppyseed pancakes with yogurt glaze
244QCQWSrk4Bba4fmHXQ	handful of mixed nuts	handful of mixed nuts
2jy6mF8DQaFNd7Qb7Jf	Egg and Bacon	eggs peameal onions mushrooms spinach and peppers.
2PHao2wRxtguM3RCJza	panini and soup	homemade paninis with butternut squash soup and
3H3ohVwMQZcaUOCj80fH	Kichidi	yellow lentil and rice with plain yogurt and mango chutney
47qUEubYyuuwixGL2rbF	Chicken on the Sticks	Fries with Shawarma chicken and garlic sauce
4MdS2C755wcR88vCki40	Caramel Rice Cake	1 Quaker caramel chocolate chip rice cake
4nqSUEfO5gZNRVoGslrL	peameal bacon and eggs	peameal bacon, and over easy eggs
54bq7ApBkCKJgEA88VfV	Snack	Greek yogurt strawberries granola
58B3bEU7YvbEk9mx0tPh	shmood	peanut butter protein powder strawberries bananas
5PT1UVg4XOqIDYcewjuy	lunch	green beans mushrooms chicken breast
5UHPGwAwI6Aolewir7eO	lunch	rice with chicken and a samosa
5XN0NFDCWDdkqcbqALt	ham burger	fries and onion rings
6J3TOzppUTHuKLF9YvVX	bagel and hash brown	plain bagel with cream cheese and hash browns
6SWPzpCizrsI93a7ABne	Snack	banana
6tf5algSVHNZCYRVuXOL	dinner	ribeye steak rice onions

195 out of 237 meals has both meal\_name and meal\_description.

# Natural Language Processing of Spoken Diet Records (SDRs)

by Ronilda Lacson MD, PhD<sup>a,b</sup> and William Long PhD<sup>a</sup>

Recording Message => Dietary information

- Collect 128 voice messages through phone
- data processing (Training set labled manually)
  - Identify food item
  - Quantification of Food Items ("one," "small," "cup",etc)
  - Classification of Food Quantifiers
- Result

Model	Accuracy	Baseline	p-value (Fisher's Exact)
Identification of Food Items	0.95	0.85	p<0.0001
Quantification of Food Items	0.98	0.84	p<0.0001
Classification of Food Quantifiers	0.92	0.74	p<0.0001
Temporal Annotation	1.00	0.54	p<0.0001

Actual Transcript of SDR	for breakfast this morning i had a bowl of <cereal> with <blueberries> on top and <milk> and a small <orange juice> and a cup of <coffee>
Annotated SDR	for breakfast this morning i had a bowl of <food> with <food> on top and <food> and a small <food> and a cup of <food>

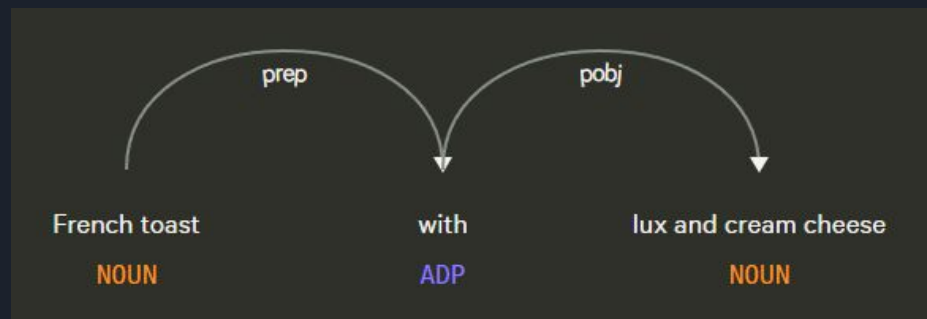
Category	Food Item	Food Quantifier
Small	toast, wine, soup	small, slice, few, fourth
Medium	carrots, porridge	medium, slice
Large	applesauce	ten, large

Lacson R, Long W. Natural language processing of spoken diet records (SDRs). *AMIA Annu Symp Proc.* 2006;2006:454-458.

# NLP module spaCy

0EQbITQpd5lgWz9P3Ncx 04/03/2022 18:38:49 False French t toast with lux and cream cheese

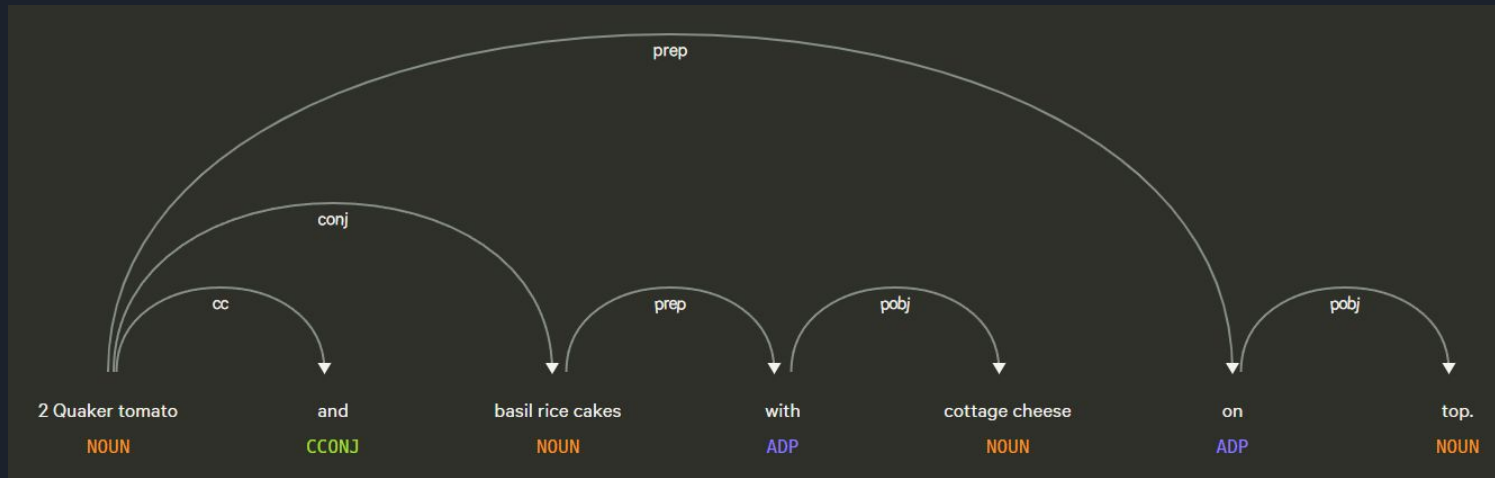
- tokenization
- parse and tag



TEXT	LEMMA	POS	TAG	DEP	SHAPE	ALPHA	STOP
Apple	apple	PROPN	NNP	nsubj	Xxxxx	True	False
is	be	AUX	VBZ	aux	xx	True	True
looking	look	VERB	VBG	ROOT	xxxx	True	False

# Parsing

2 Quaker tomato and basil rice cakes with cottage cheese on top.





meals_id	meal_time	is_home_made	meal_description
03US3Htlf00rbRblmZA5	03/29/2022 14:05:39	False	2 Quaker tomato and basil rice cakes with cottage cheese on top. 1 Quaker ca
0EQbITQpd5lgWz9P3Ncx	04/03/2022 18:38:49	False	French t toast with lux and cream cheese
0z6979wb8D4XaV3h0tfZ	03/04/2022 18:43:26	False	menu
12t52QXAVmhgHnQyBxxp	03/31/2022 10:41:48	True	cinnamon raisin bagel with peanut butter and strawberries
17JfaWQ4BIAU2uji9QXA	05/07/2022 11:32:32	False	soup
1iMljKjRrZr4RjSPR2lw	04/05/2022 19:03:27	False	eggs with veggies, toast, and fruit on the side
1oqrY5L2TEKB3LlrNJBF	03/31/2022 14:46:31	True	lemon poppyseed pancakes with yogurt glaze
1wAR4rCdAGliEIIjCSF	04/04/2022 17:04:46	False	chicken stracciatella soup
244QCQWSrk4Bba4fmHXQ	04/04/2022 11:30:31	True	handful of mixed nuts

tomato, basil rice cakes, cottage cheese, caramel chocolate chip, rice cake, peanut butter, tangerine toast, lux and cream cheese

cinnamon, raisin bagel, peanut butter, strawberries  
 soup  
 eggs, veggies, toast, fruit  
 lemon, pancakes, yogurt  
 chicken, soup  
 nuts



# Extracted informations

meals_id	meal_time	is_home_made	meal_description
03US3Htlf00rbRbImZA5	03/29/2022 14:05:39	False	2 Quaker tomato and basil rice cakes with cottage cheese on top. 1 Quaker ca
0EQbITQpd5IgWz9P3Ncx	04/03/2022 18:38:49	False	French t toast with lux and cream cheese
0z6979wb8D4XaV3h0tfZ	03/04/2022 18:43:26	False	menu
12t52QXAVmhgHnQyBxxp	03/31/2022 10:41:48	True	cinnamon raisin bagel with peanut butter and strawberries
17JfaWQ4BIAU2uj9QXA	05/07/2022 11:32:32	False	soup
1iMljKjRrZr4RjSPR2lw	04/05/2022 19:03:27	False	eggs with veggies, toast, and fruit on the side
1oqrY5L2TEKB3LirNJBf	03/31/2022 14:46:31	True	lemon poppyseed pancakes with yogurt glaze
1wAR4rCdAGliEIIjCSF	04/04/2022 17:04:46	False	chicken stracciatella soup
244QCQWSrk4Bba4fmHXQ	04/04/2022 11:30:31	True	handful of mixed nuts

Use python sql connector to store the extracted nutrient information back into the database (ingredient table)

ingredients_id	meals_id	ingredients
03US3Htlf00rbRbImZA5_01	03US3Htlf00rbRbImZA5	2 Quaker tomato
03US3Htlf00rbRbImZA5_02	03US3Htlf00rbRbImZA5	basil rice cakes
03US3Htlf00rbRbImZA5_03	03US3Htlf00rbRbImZA5	cottage cheese
03US3Htlf00rbRbImZA5_04	03US3Htlf00rbRbImZA5	1 Quaker caramel chocolate chip rice cake
03US3Htlf00rbRbImZA5_05	03US3Htlf00rbRbImZA5	peanut butter
03US3Htlf00rbRbImZA5_06	03US3Htlf00rbRbImZA5	1 tangerine
0EQbITQpd5IgWz9P3Ncx_01	0EQbITQpd5IgWz9P3Ncx	French t toast
0EQbITQpd5IgWz9P3Ncx_02	0EQbITQpd5IgWz9P3Ncx	lux and cream cheese
12t52QXAVmhgHnQyBxxp_01	12t52QXAVmhgHnQyBxxp	cinnamon raisin bagel
12t52QXAVmhgHnQyBxxp_02	12t52QXAVmhgHnQyBxxp	peanut butter
12t52QXAVmhgHnQyBxxp_03	12t52QXAVmhgHnQyBxxp	strawberries
17JfaWQ4BIAU2uj9QXA_01	17JfaWQ4BIAU2uj9QXA	soup
1iMljKjRrZr4RjSPR2lw_01	1iMljKjRrZr4RjSPR2lw	eggs

## Discussion

- Train the single-labeled food image recognition model with more food categories
- Develop a multi-labeled food image recognition model
- Audio description (NLP)
- ML model on Firebase environment

