

IOT ANALYTICS

wifi Locationing

ALINE BARBOSA ALVES

PRES ENTATION OVERVIEW

TOPICS TO DISCUSS

1. Main goal
2. Context
3. Data
4. Models
5. Chosen model
6. Expectations
7. Next steps
8. Questions

MAIN GOAL

EVALUATE TECHNIQUES FOR WIFI
LOCATIONING

Help people to navigate a complex and unfamiliar interior space without getting lost



Context

1

GPS INDOOR

GPS does not work well indoors

2

LOCATION <> DIRECTION

While indoor positioning systems can determine location, many need additional information to determine which way a person or object is facing

3

WIFI FINGERPRINTING

Based in RSSI signal strength from several access points

4

OTHER TECHNIQUES

Other solutions use light or magnetic fields to determine location

DATA

HOW IS THE DATA?

RSSI

- 520 WAPs
- Negative values from -104 (weak) to 0 (strong)
- 100 means 'not found'

LOCALIZATION

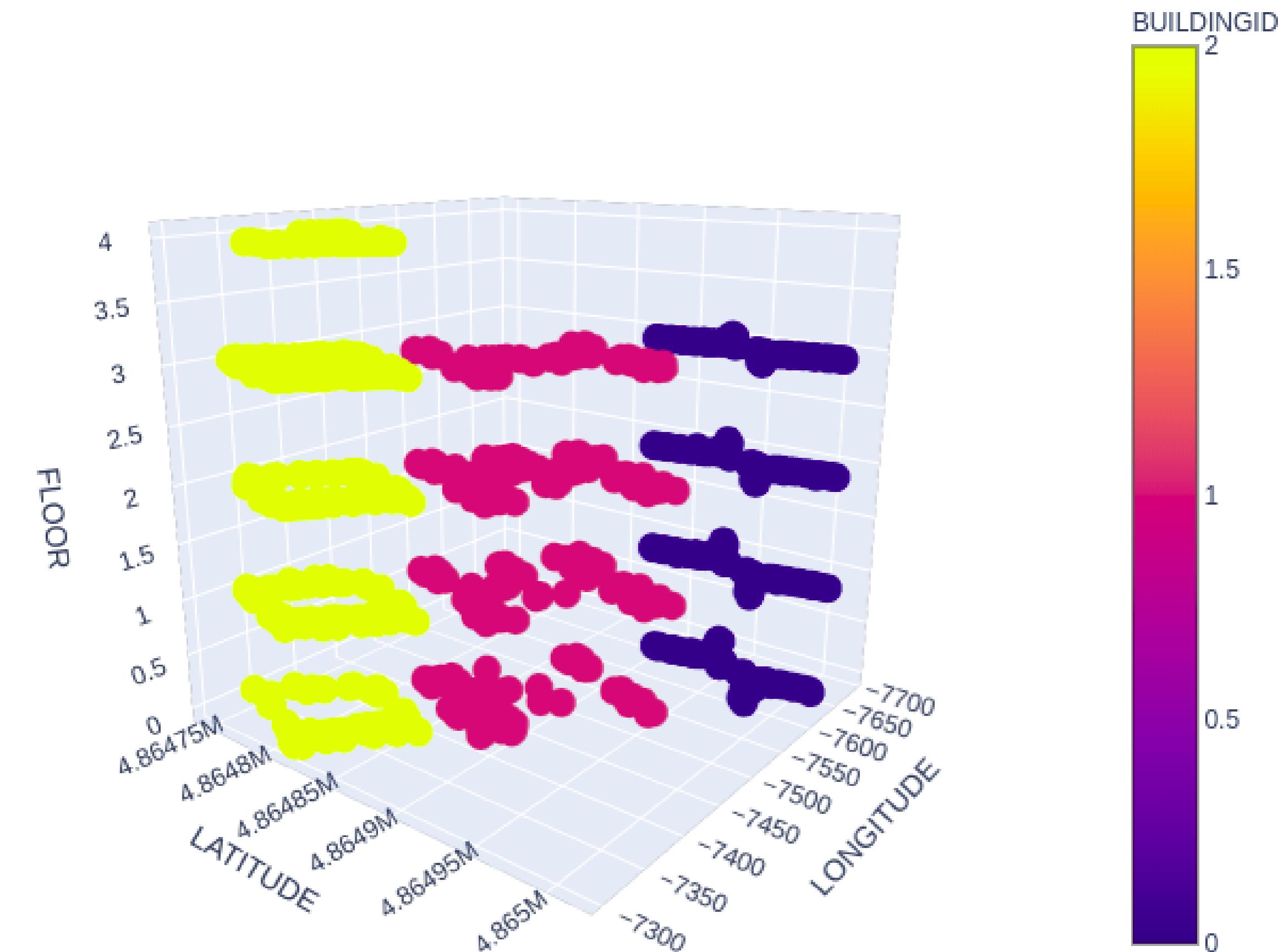
- Latitude
- Longitude
- Floor - 5 floors
- Building - 3 buildings
- Relative position - inside / outside

USER

- 18 users
- 1 validation user
- Height

DEVICE

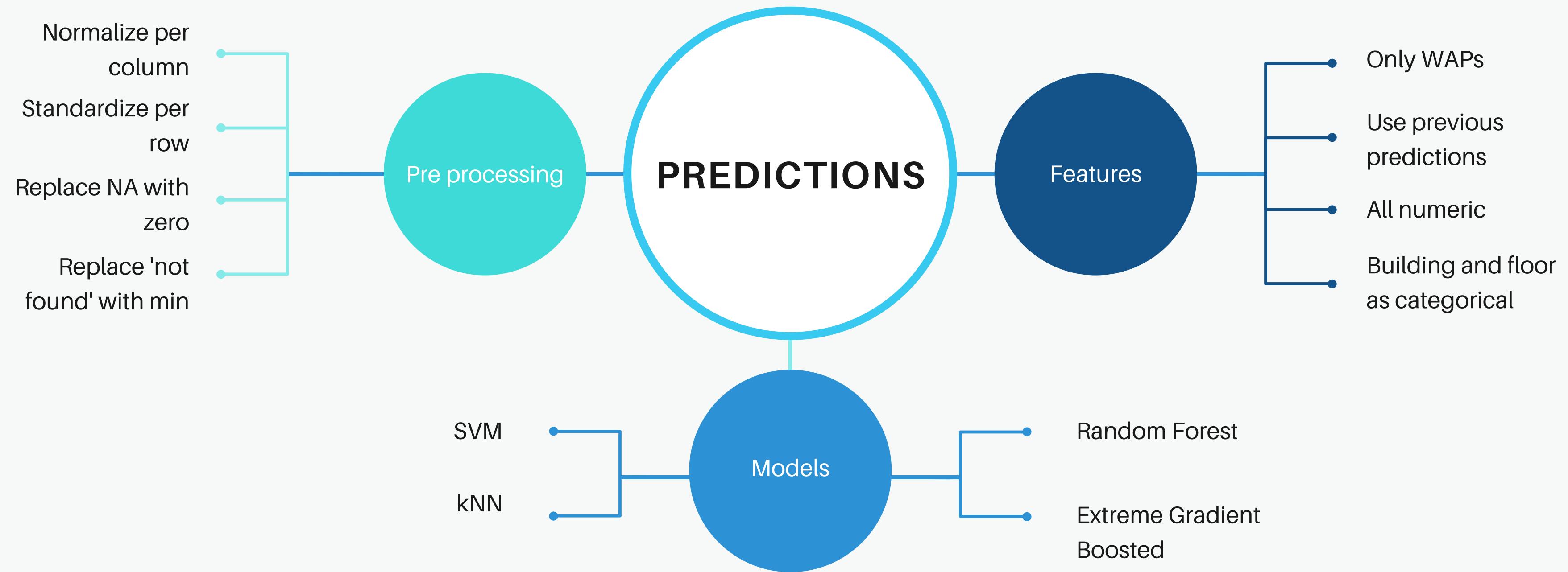
- 25 devices
- Informations



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MODELS

WHAT DID WE TRY?



CHOSEN MODEL



Building

- Set Building and Floor as categorical
- Replace 'not found' with the min
- Standardize WAPs and replace NAs with zero
- Use SVC to predict building
- Accuracy:

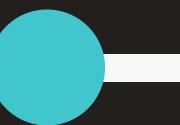
1



Floor

- Append predicted building in data
- Use SVC to predict floor
- Accuracy:

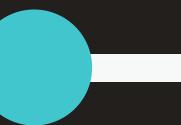
0.9541



Latitude

- Append predicted floor in data
- Put WAPs < 0 as zero
- Split data per building
- Use Random Forest to predict latitude
- Mean Absolute Error:

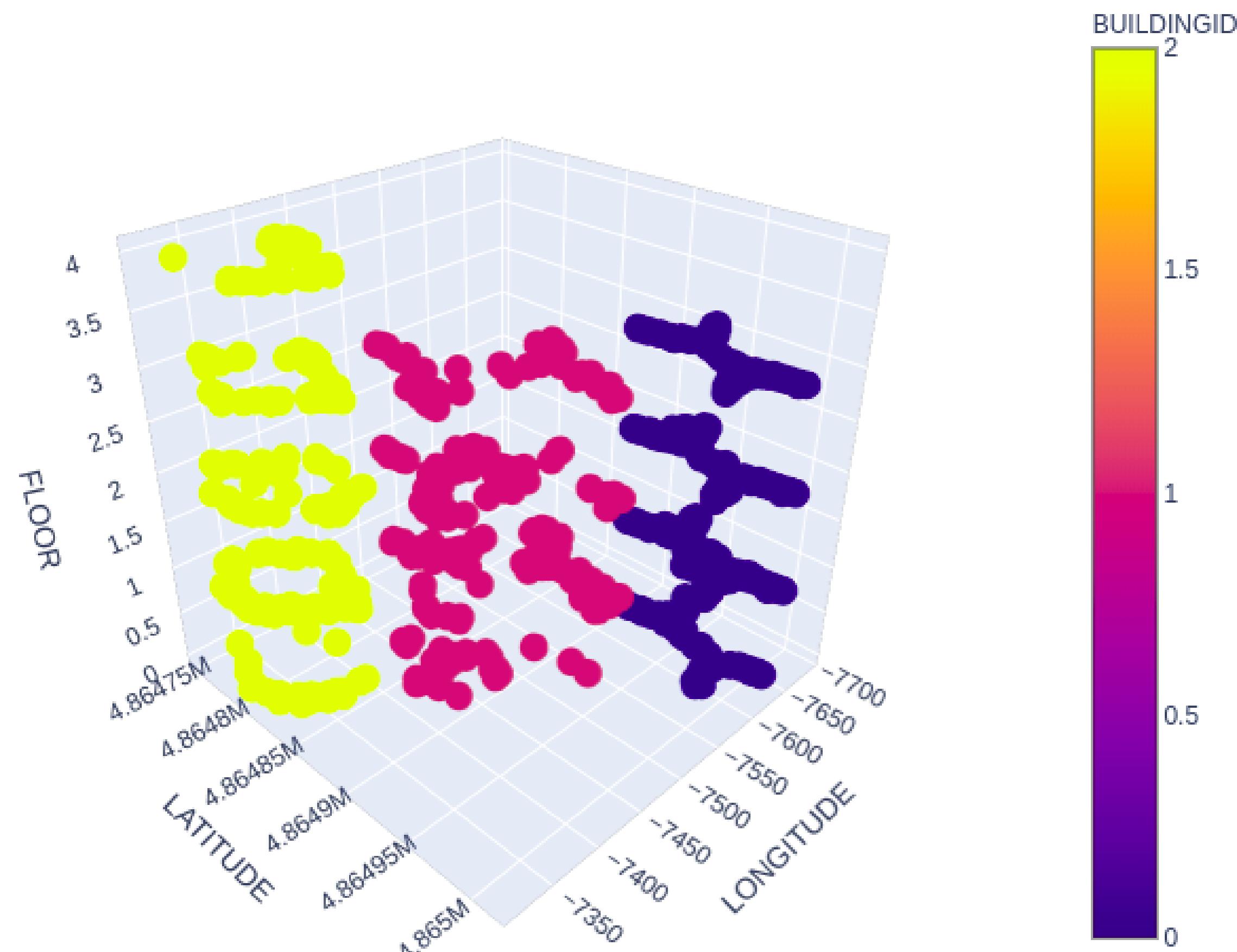
5.8949



Longitude

- Append predicted latitude in data
- Split data per floor
- Use Random Forest to predict longitude
- Mean Absolute Error:

7.1219



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EXPECTATIONS

Floor

From 93.5% to 96.5%

Latitude

From 5.3 to 6.5 meters

Longitude

From 6.1 to 8.2 meters

NEXT STEPS

WHAT CAN WE DO BETTER?



Use more features in the model



Rotate the map to predict less area



Detect new or useless WAPs automatically

QUESTIONS?