

# Wifi Location



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# Introduction



## Aim

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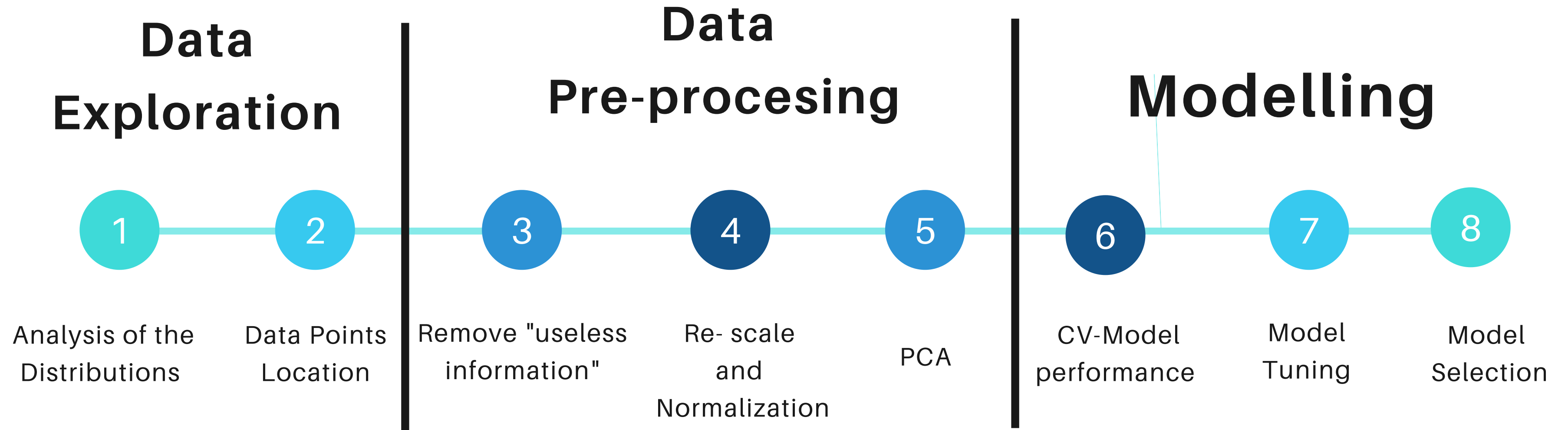
- The goal of this project is to investigate the feasibility of using "Wifi fingerprinting" to determine a person's location in indoor spaces.

## Data

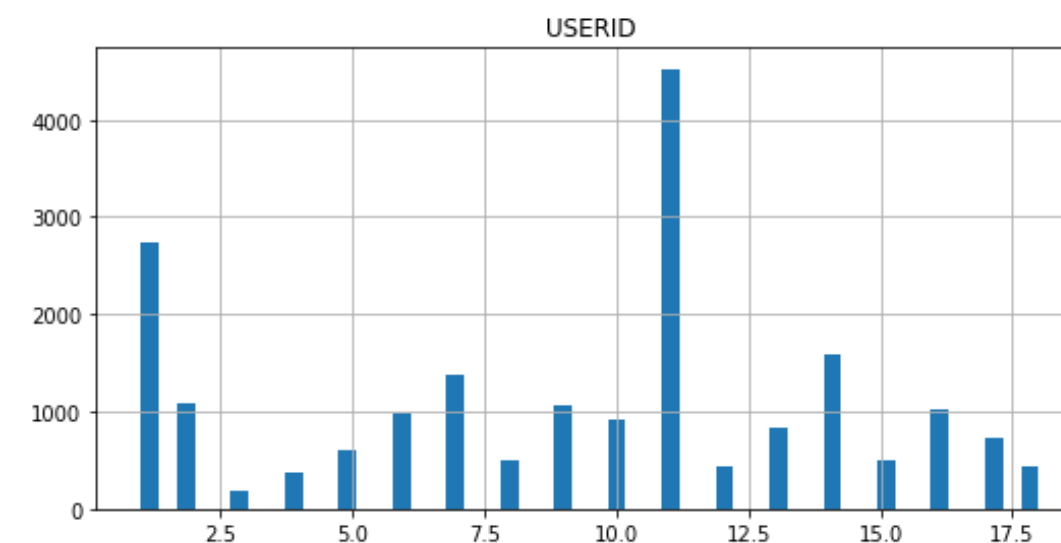
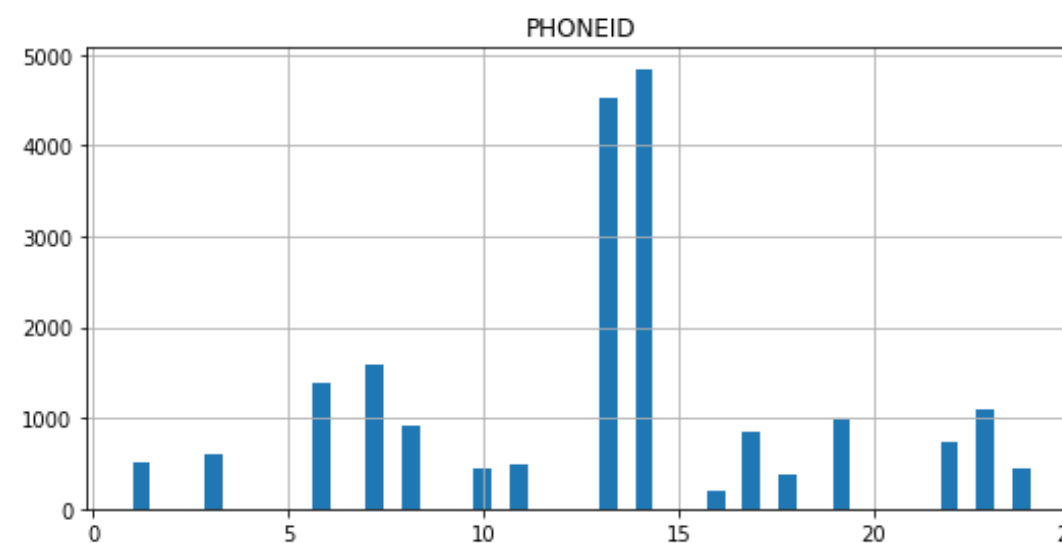
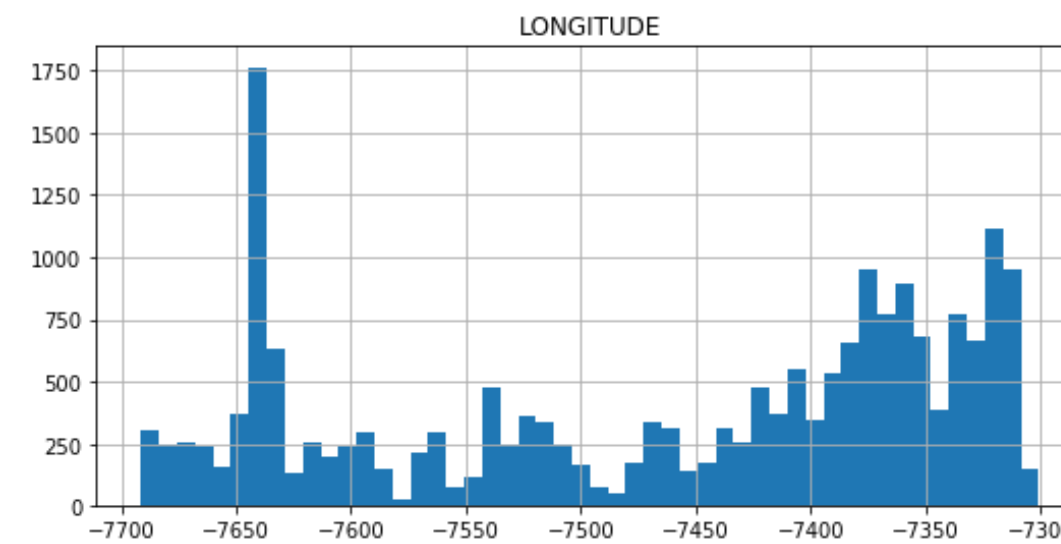
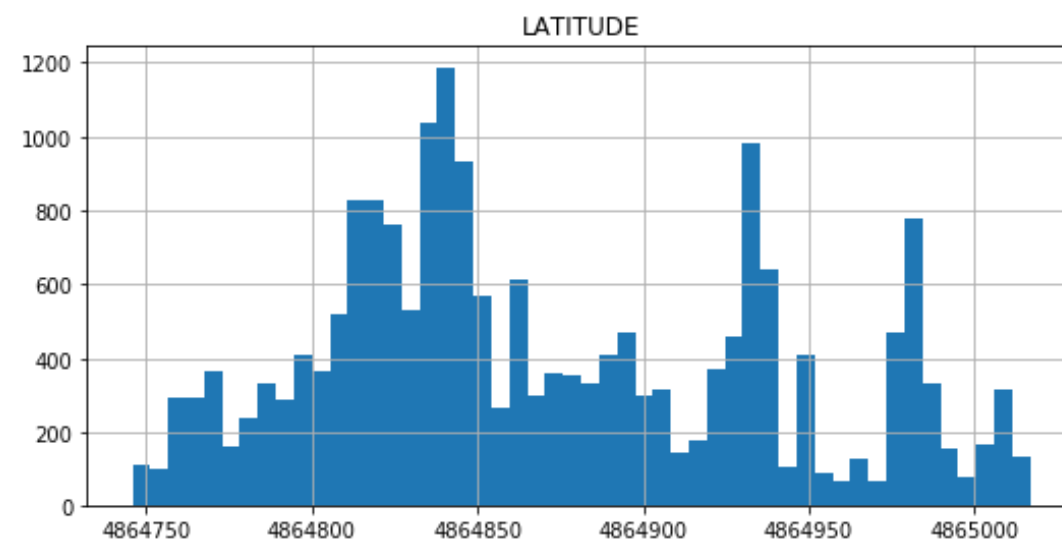
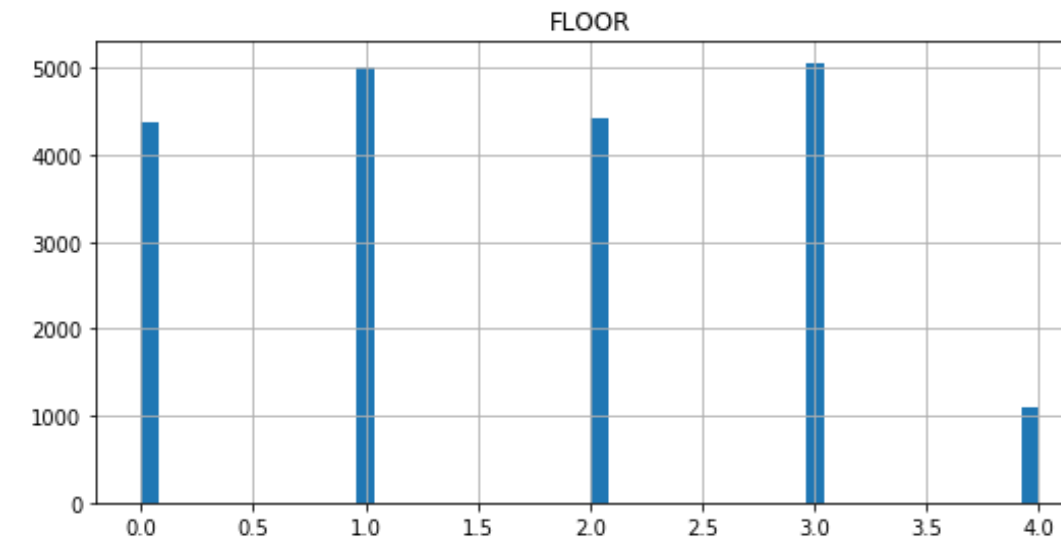
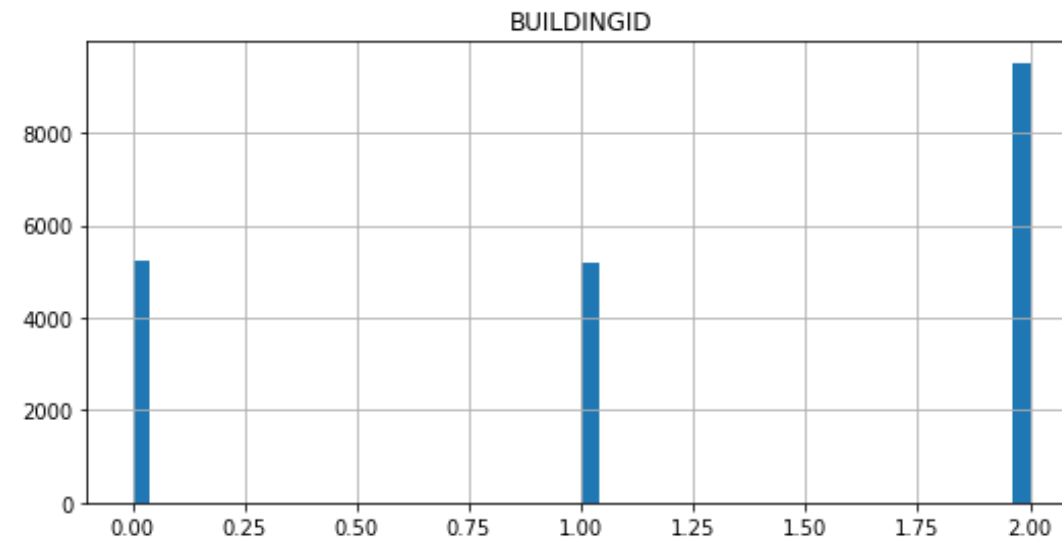
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- Data base from the Universitat Jaume I which contains 19936 observations on the training set and 1111 on the validation set.
- There are 529 attributes of which 520 belongs to the Wireless Access Points (WAPs).
- The target variables for the predictions are : Building, Floor, Latitude and Longitude.

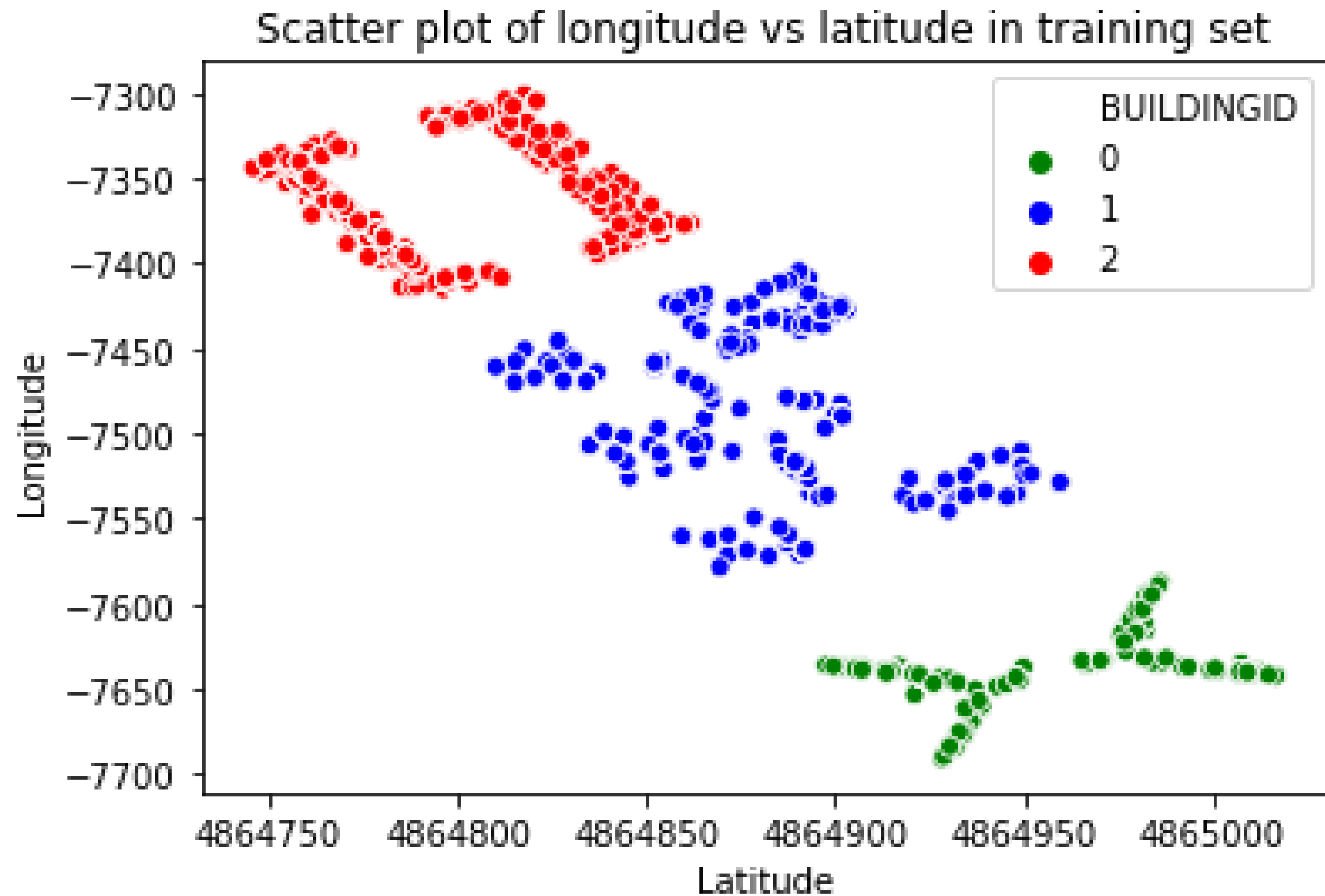
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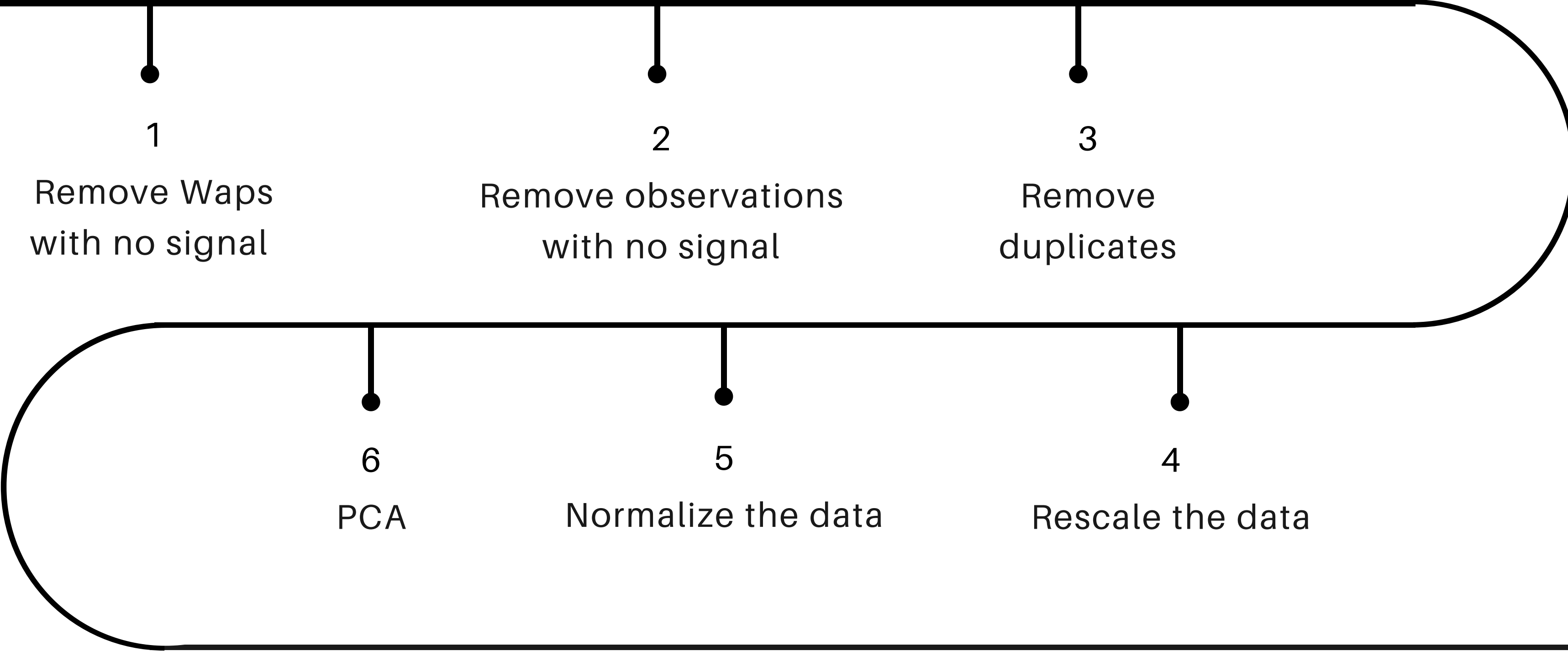
## Distribution Graphs



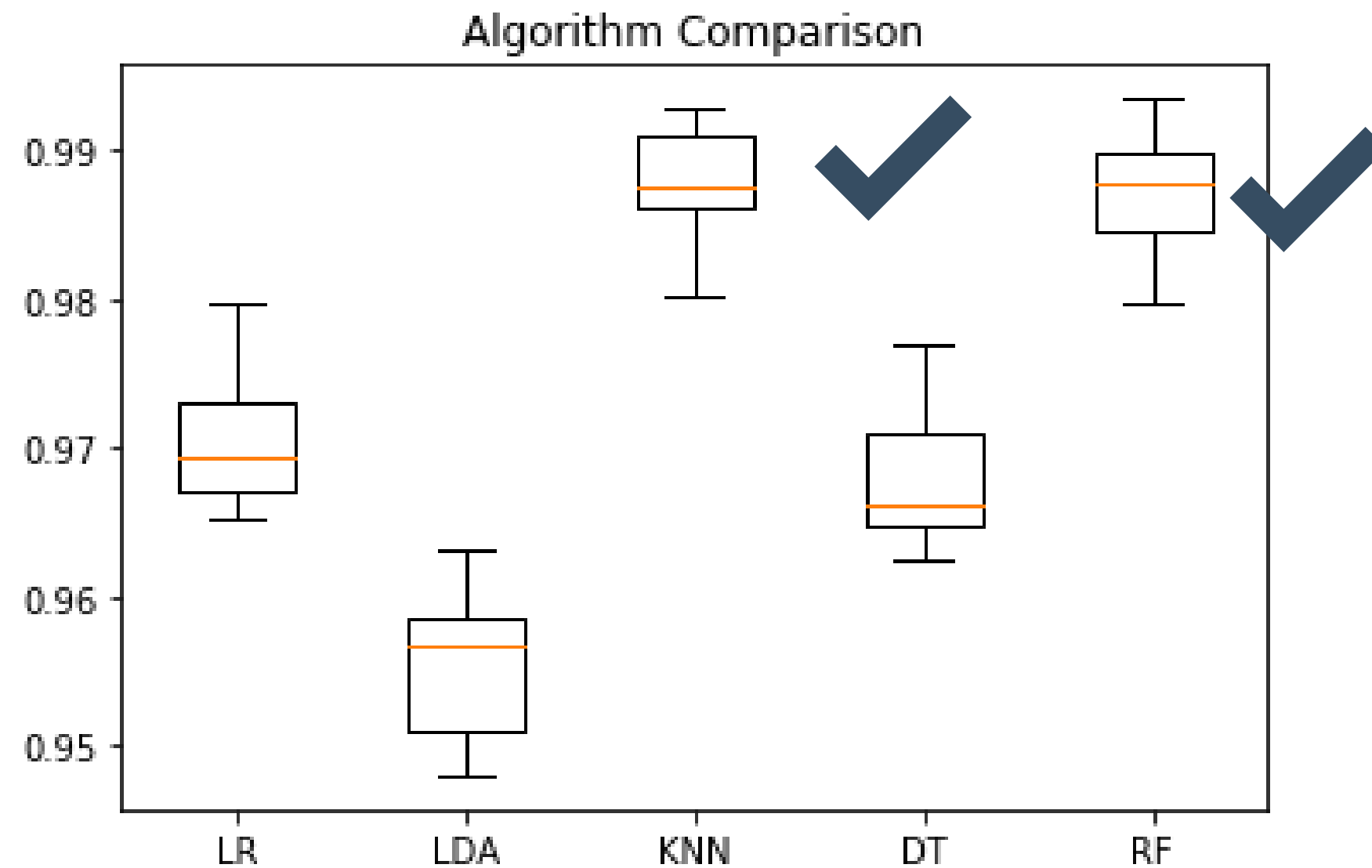
# Data Points Location



# Preprocessing Flow



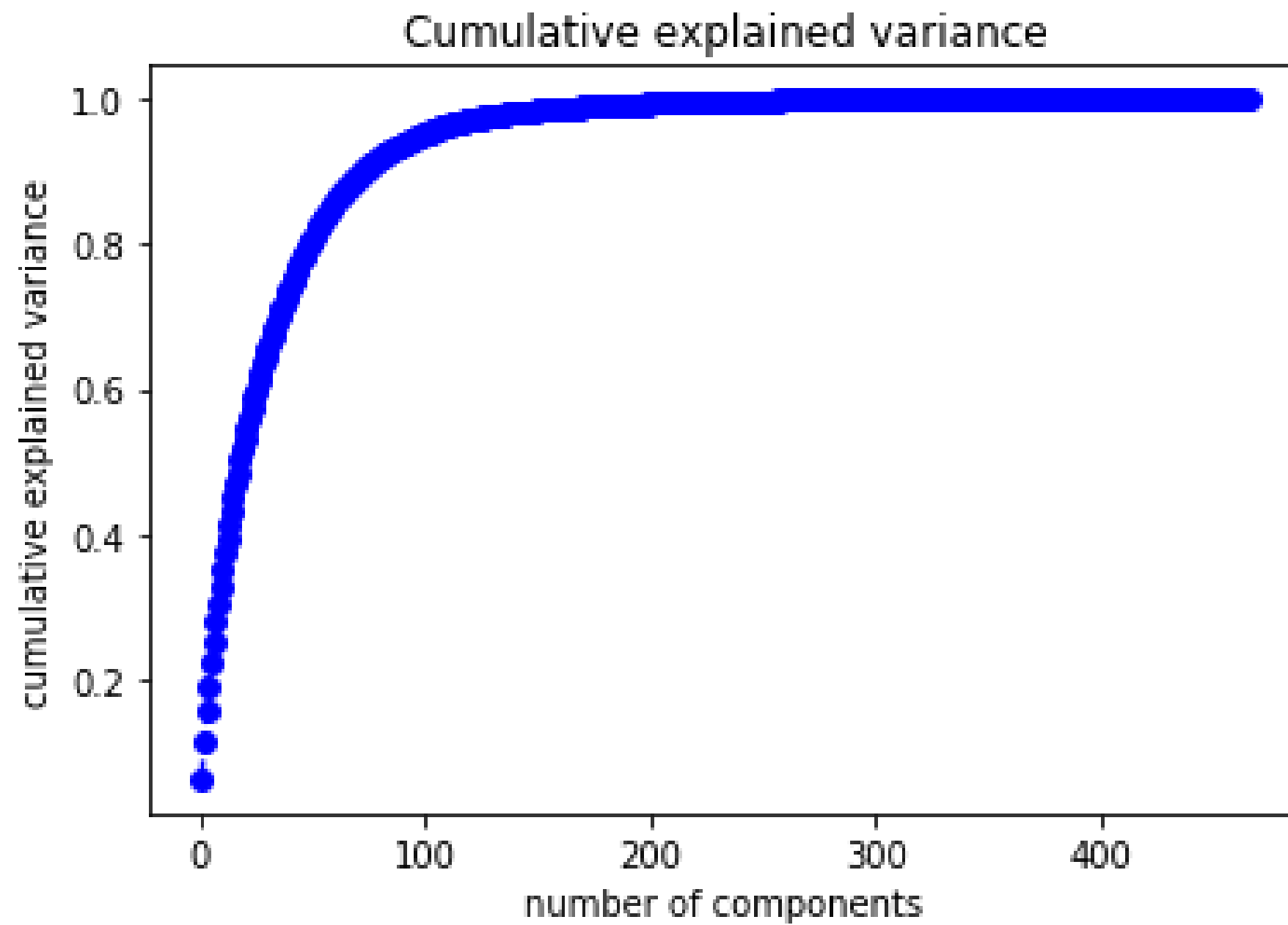
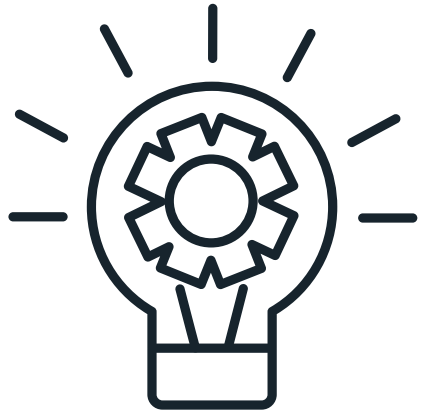
Floor



- KNN and RF are the ones that perform better over the rest

**Data  
Pre-processing**

# Differents Assumptions Considered



## OPTION 1

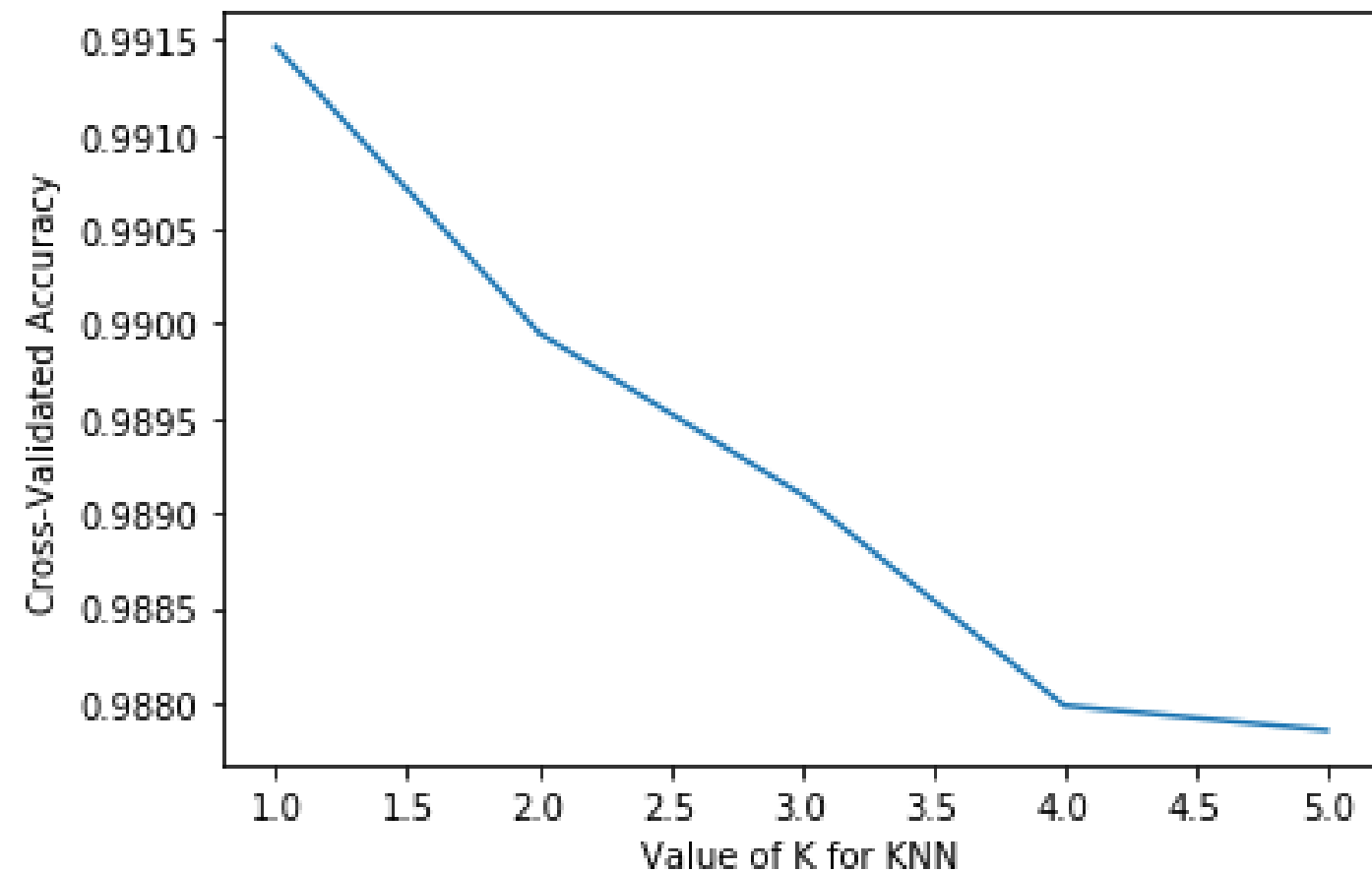
- PCA= 100 components
- Re-scaling= Exponentiating
- Final Shape of WAPs= (19039, 100)

## OPTION 2

- PCA= 99%
- Re-scaling= Positive values data representation.
- Final Shape of WAPs= (19039, 244)



## Hyper parameter tuning-KNN



## Hyper parameter tuning-RF

**Parameters:** {'n\_estimators': 100,  
'min\_samples\_split': 2,  
'min\_samples\_leaf': 2,  
'max\_features': 'sqrt', 'max\_depth':  
100, 'bootstrap': False}

## KNN evaluation

Accuracy 0.949595 Kappa 0.929398

### Confusion matrix

```
[[124  6   2   0   0]
 [ 16 438  7   1   0]
 [  1  12 288  5   0]
 [  0   0   2 170  0]
 [  0   0   0   4 35]]
```

## Random Forest evaluation

Accuracy 0.951395 Kappa 0.931686

### Confusion matrix

```
[[119  11   2   0   0]
 [ 10 441  9   2   0]
 [  1  11 292  2   0]
 [  0   0   2 169  1]
 [  0   0   0   3 36]]
```



# Results



OPTION 1

BUILDING ID	FLOOR	LATITUDE	LONGITUDE
Model: RF Accuracy: 100%	Model: RF Accuracy: 95%	Model: RF RMSE: 7.21	Model: RF RMSE: 7.94

OPTION 2

BUILDING ID	FLOOR	LATITUDE	LONGITUDE
Model: LR Accuracy: 100%	Model: KNN Accuracy: 90%	Model: KNN RMSE: 9.48	Model: KNN RMSE: 9.29