



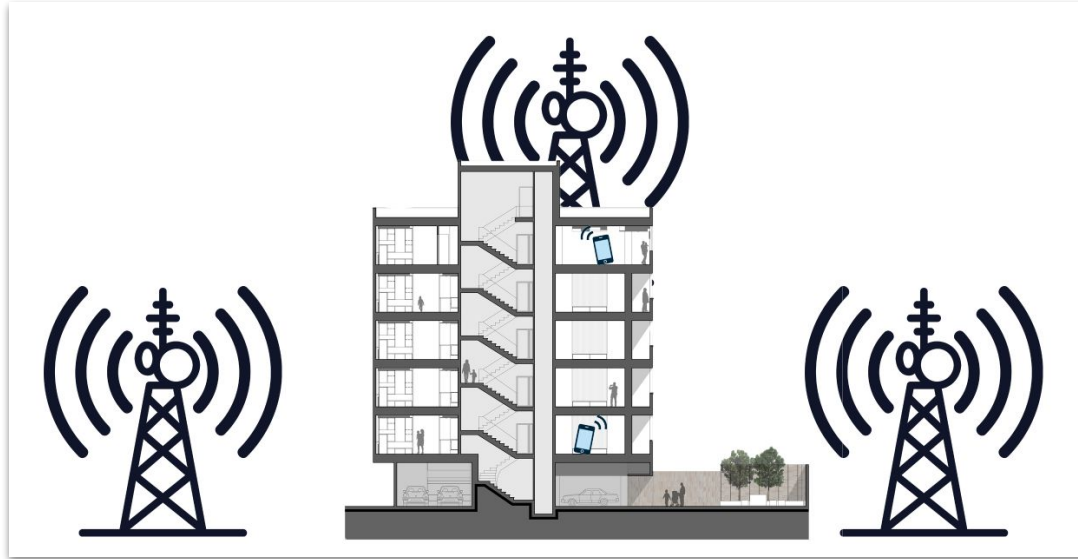
Floor Localization

CS 435: Deep Learning
Course Project Milestone 1 Update

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Problem Statement

- Create a floor localization system that can predict a user's floor depending only on cellular signals





Related Work

- **Floor Localization**
 - **SkyLoc**
 - Addressed the floor localization problem using GSM
 - Uses a fingerprinting with a nearest neighbour classification approach
 - **StoryTeller**
 - Solves the same problem using Wi-Fi beacons, using a technique that is building independent
- **2D Localization**
 - **CellSense**
 - **OmniCell**
 - **MonoDCell**



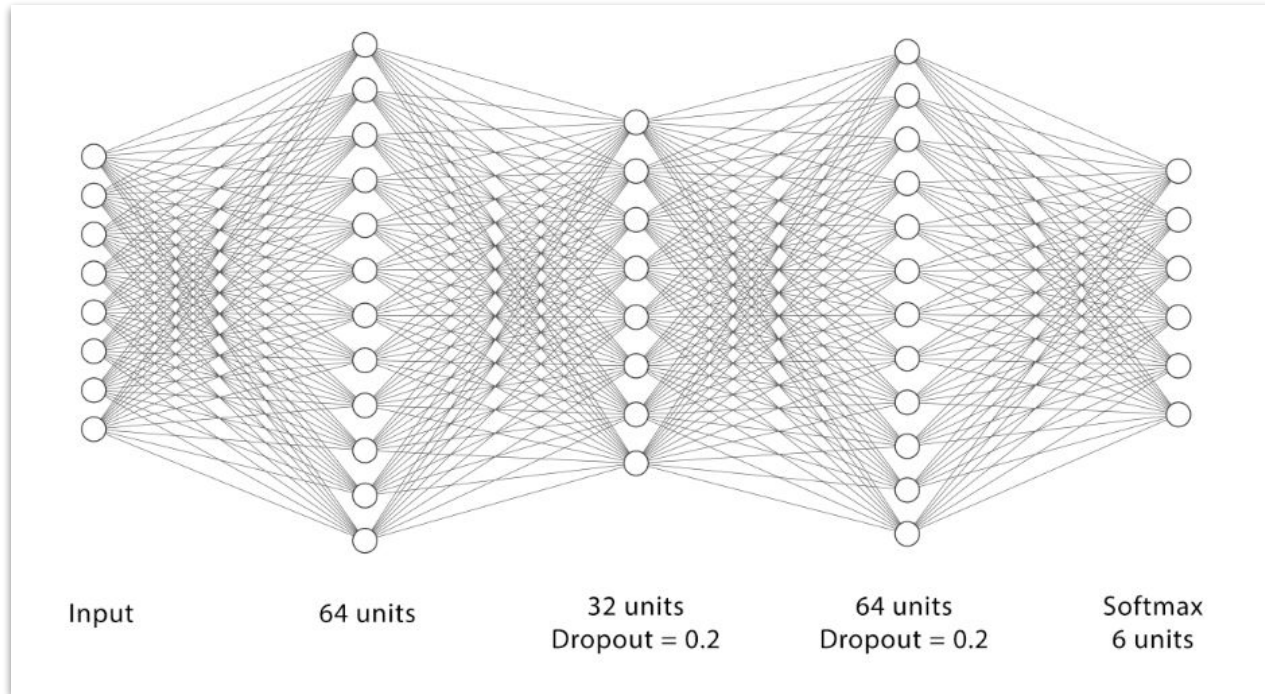
Progress

- Collected data from the campus in the Electrical Engineering building
 - Samples were collected from 6 floors of the building
 - Data was collected using five different phones on two carriers, namely Vodafone and Orange
- Experimented with multiple architectures and produced initial results

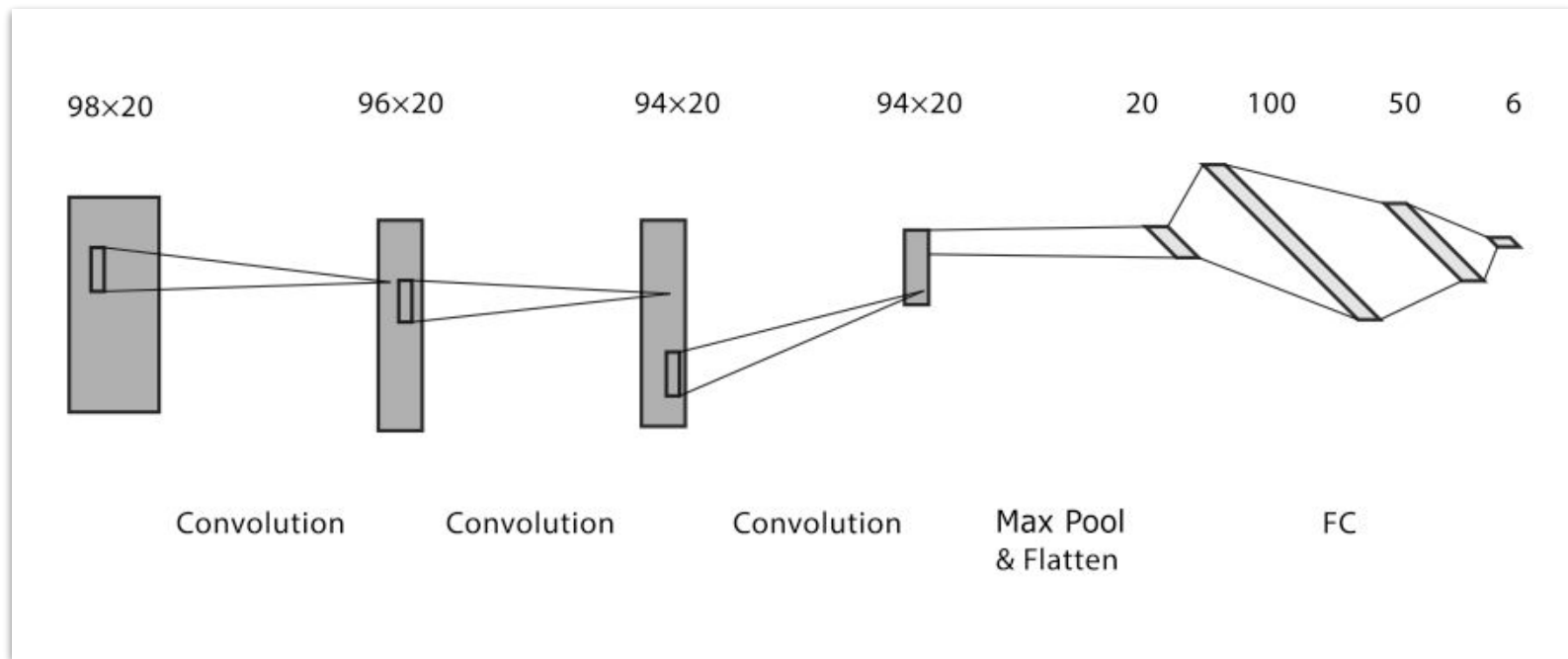


Base Approach

- In our project, we aim to experiment with many approaches, gaining more intuition about the problem with each experiment
- We experimented with two architectures
 - A fully connected network with one RSS vector as input
 - A CNN that takes sequence of RSS vectors as input

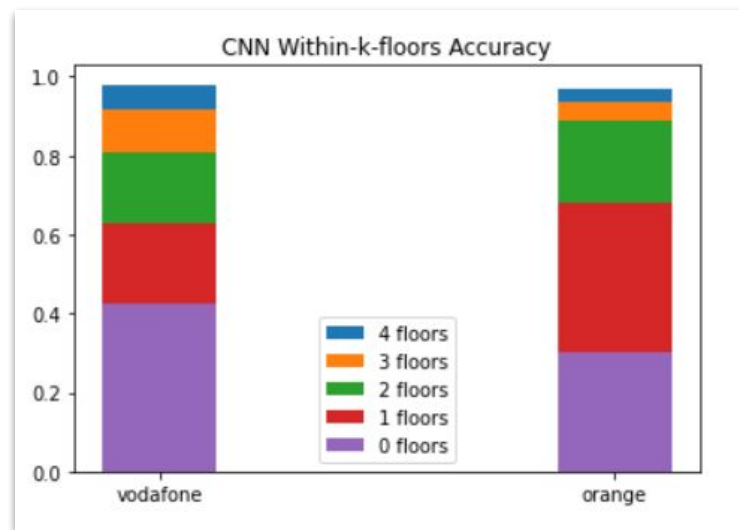
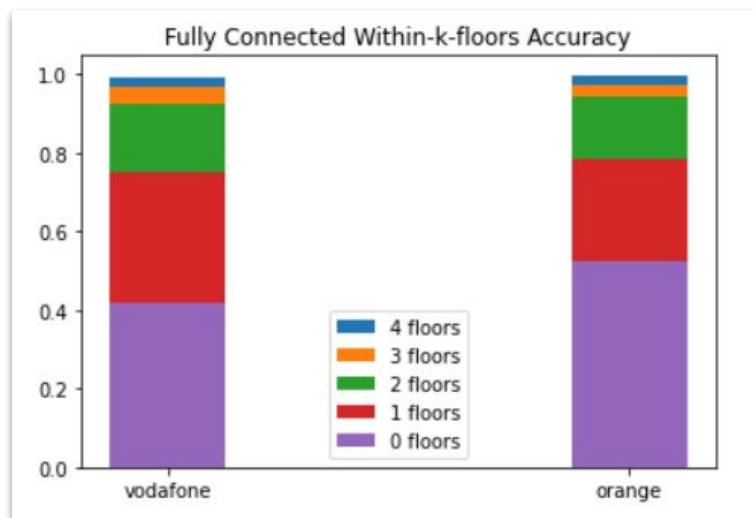


Fully connected architecture



CNN architecture for multivariate time series classification

Initial Results





Initial Results

- $K = 0$ represents classification accuracy

Within-k-floors Accuracy				
K	Fully Connected		CNN	
	Vodafone	Orange	Vodafone	Orange
0	0.53	0.42	0.43	0.30
1	0.79	0.75	0.63	0.68
2	0.94	0.92	0.81	0.89
3	0.97	0.97	0.92	0.94
4	1.00	0.99	0.98	0.97
5	1	1	1	1



Next Steps

1. Data augmentation to increase test accuracy
2. Try other techniques/architectures to make training independent of mobile phone type
3. If applicable, collect data from other building and test it using our highest accuracy model
4. Write the final poster



Thank you.

