Device-Free User Authentication Using Wi-Fi.

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Introduction

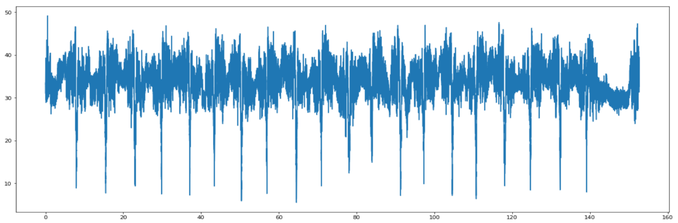
Achieve user authentication by analyzing variations in Wifi channel state information (CSI) caused by human activity

1. Segment CSI data into discrete activities
2. Generate time and frequency domain plots of activities
3. Create model to recognize user behavior and identity

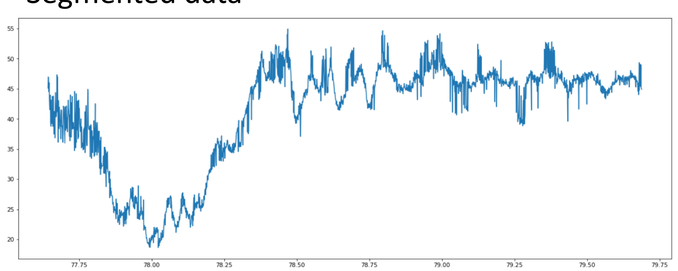
Data Segmentation

- Detect presence of human activities & precisely segment the corresponding CSI measurements.
- CSI data is segmented using moving variance in MATLAB.
- The size of the window for data segmentation was 2 seconds.

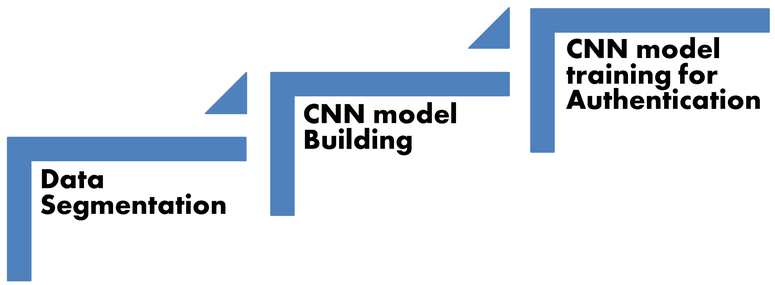
Raw CSI Data



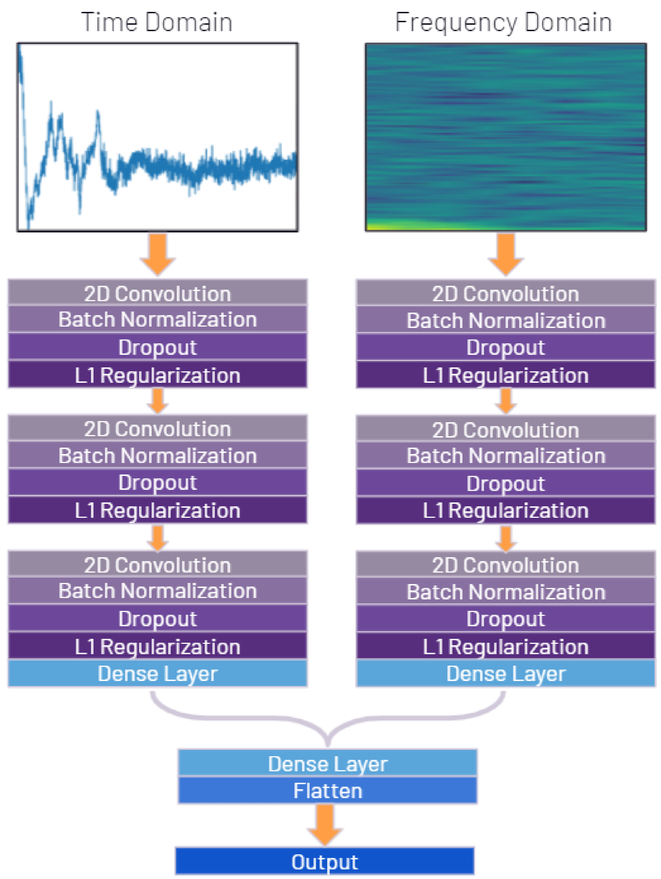
Segmented data



Methodology



CNN Model



Conclusions

- A device-free user authentication system by extracting unique behavioral characteristics captured by the CSI measurements in WiFi signals.
- An environment-independent system, was designed with the help of an unsupervised domain adaptation strategy to remove the location and environment-specific information entangled in CSI measurements to build an environment independent model for user identification and activity recognition.
- The system has the capability of authenticating users through daily behaviors under various scales of location variations and environmental changes

References

Shi, C., Liu, J., Borodinov, N., Leao, B., & Chen, Y. (2020). Towards environment-independent behavior-based user authentication using wifi. *2020 IEEE 17th International Conference on Mobile Ad Hoc and Sensor Systems (MASS)*. https://doi.org/10.1109/mass50613.2020.00086

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