3DHAR-AI

A Spatial-Temporal Graph Neural Network approach to Human Activity Recognition and Prediction

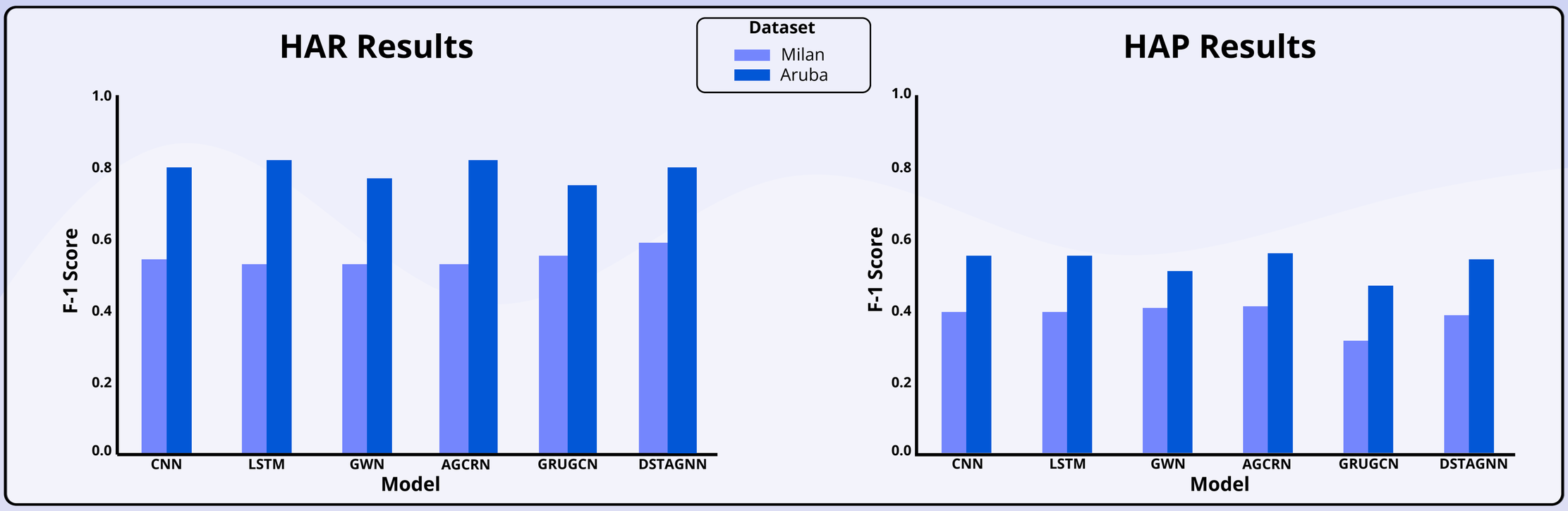
OVERVIEW

Human Activity Recognition and Prediction (HAR/HAP) see many applications in healthcare, surveillance, and smart homes. Yet, capturing the complex patterns of human movement over time remains challenging. Our project explores **Spatio-Temporal Graph Neural Networks (STGNNs):** advanced AI models designed to better recognise and predict human actions from time-series data, potentially improving accuracy and real-world applicability.

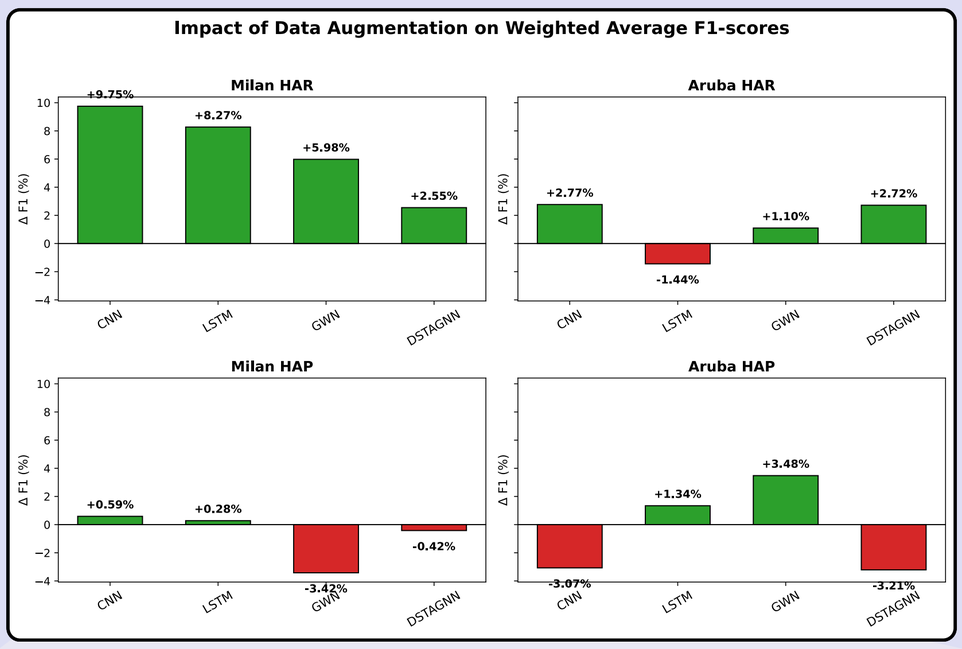
OBJECTIVES

- Investigate the performance of 3 **state-of-the-art STGNN models** against traditional deep learning models.
- Uncover the **dynamics of human activity** for future HAR and HAP research.
- Develop a **3D environment** to be used for data augmentation.

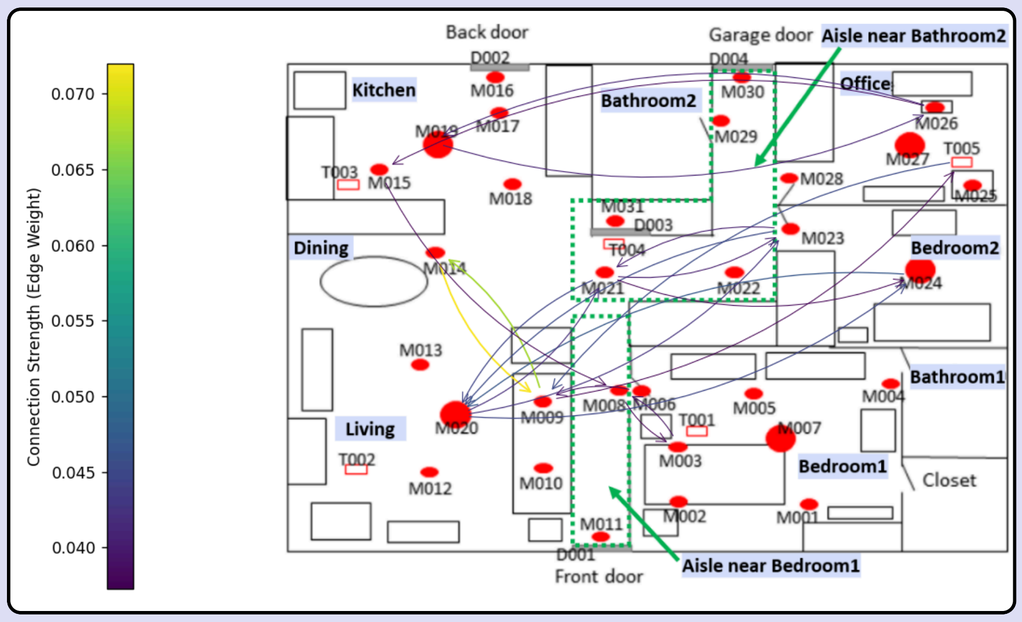
RESULTS



Data Augmentation



Example of Learned Graph Structure



CONCLUSION

- All models demonstrated stronger performance on the HAR task than on the HAP task.
- STGNNs showed inconsistent and marginal performance improvements over baselines.
- **However**: Analysis of these complex models was still **valuable**, as visualising learned graph structures revealed interpretable insights into activity dynamics.
- Data Augmentation showed promising performance for **HAR** but more variable results for **HAP**.

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