**Final Team Project Proposal: Human Activity Recognition Machine Learning Models**

Group 6

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**1.** Using the HARTH dataset, the goal of this project is to develop predictive models and compare model performance using the dataset. The HARTH: Human Activity Recognition Trondheim dataset is from the UC Irvine Machine Learning Repository and is a multivariate, time-series dataset with 6,461,328 observations and 8 features including timestamp, activity label, and data from two 3-axial Axivity AX3 accelerometer sensors. The data includes back sensor acceleration data in the x, y, z directions and right thigh sensor acceleration data in the x, y, z directions. A camera was also used to annotate the frames during the activity. The dataset recorded 22 individuals for 2 hours in a free-living environment that documented 12 different activities during the sampling period at 50Hz. The plan is to use GitHub and develop the project using Python. Some of the algorithms to be investigated and considered will include Deep Learning models and other machine learning algorithms.

**2.** Some of the areas from the class and new areas to learn may include classification, deep learning models such as convoluted neural network, recurrent neural network, long short-term memory network, or other combinations. Additionally, support vector machine, multi-modal learning, and decision trees will be considered.

**3.** The expected behaviors of the models/systems are to be able to accurately predict the human activities based on all the sensor data. Even though the data has been annotated using a camera, the goal is to design several models to compare for best prediction performance and accuracy. One example is using accelerometer data to determine when a human is running or cycling with high accuracy.

**4.** The issues that will be focused on include clearly understanding the accelerometer sensor dataset including any pre-processing that may be required. The understanding and development of quality machine learning models that can predict human activity with better accuracy and performance. Some of these model algorithms will be investigated and evaluated for implementation to predict the human activities based on all the sensor data.

**5. References**

Russell, S., & Norvig, P. (2021). *Artificial intelligence: A modern approach (4th ed.).* Pearson.

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Zeng, M., Nguyen, L. T., Yu, B., Mengshoel, O. J., Zhu, J., Wu, P., & Zhang, J. (2014). Convolutional neural networks for human activity recognition using mobile sensors. *Proceedings of the 6th IEEE international conference on mobile computing, applications and services,* 197-205.

**6. Team Project Contributions**

Dheemanth: Pre-processing Dataset, Model Implementation and Code, Final Project Paper, Presentation Slides, Presentation

Andy: Pre-processing Dataset, Model Implementation and Code, Final Project Paper, Presentation Slides, Presentation

Greg: Pre-processing Dataset, Model Implementation and Code, Final Project Paper, Presentation Slides, Presentation

Other: GitHub, Project Proposal, README.md, LICENSE.md, EDA/histograms