Oct 18th, 2022

Human Activity Recognition from Accelerometer Data

Data Science Initiative, Brown University

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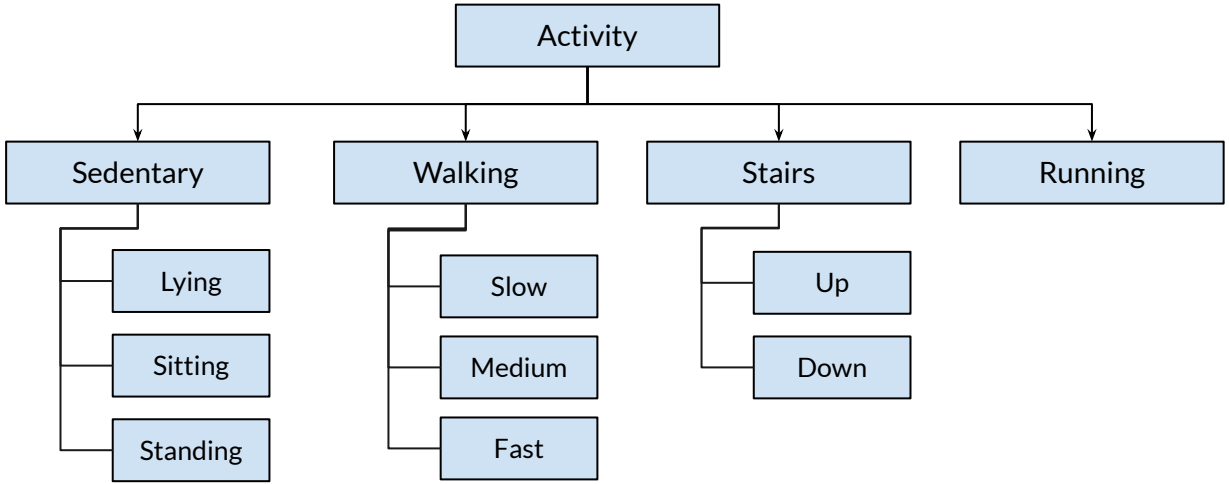
GitHub

https://github.com/raichandanisagar/human-activity-recognition

Project Goal

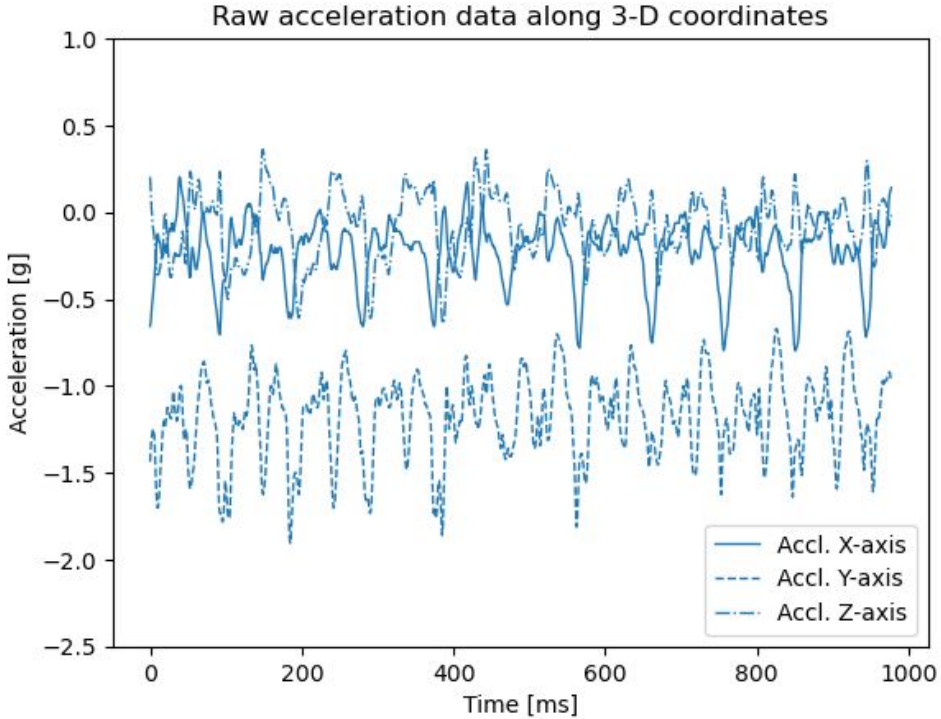
Objective

To create a subject independent classifier from time-series accelerometer data that identifies physical activity.

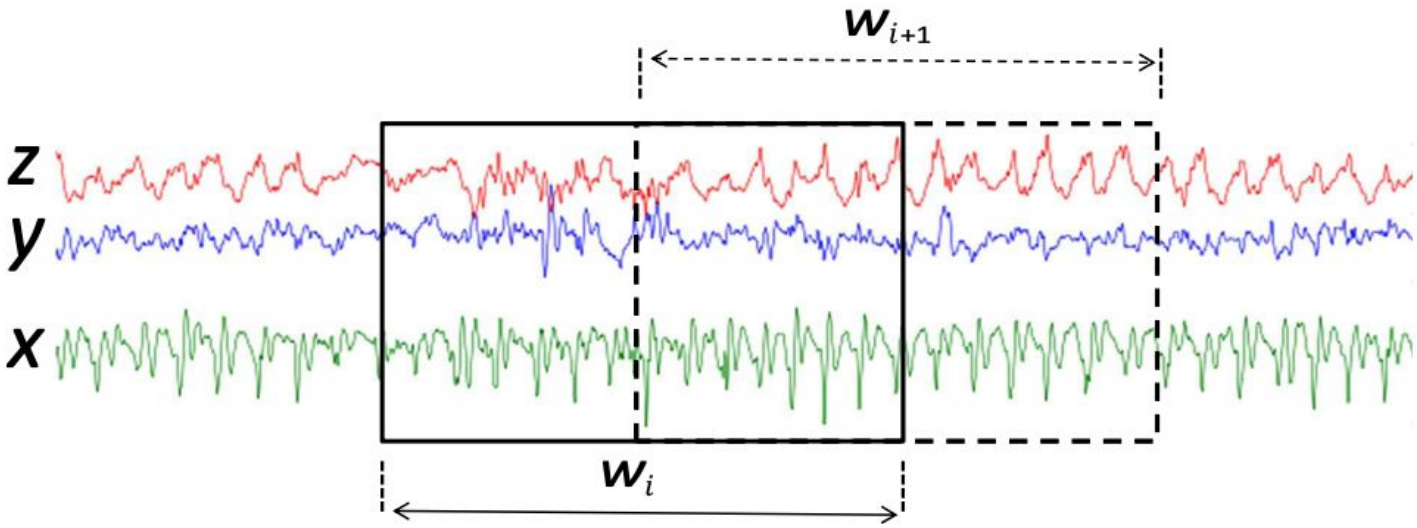


Data Description

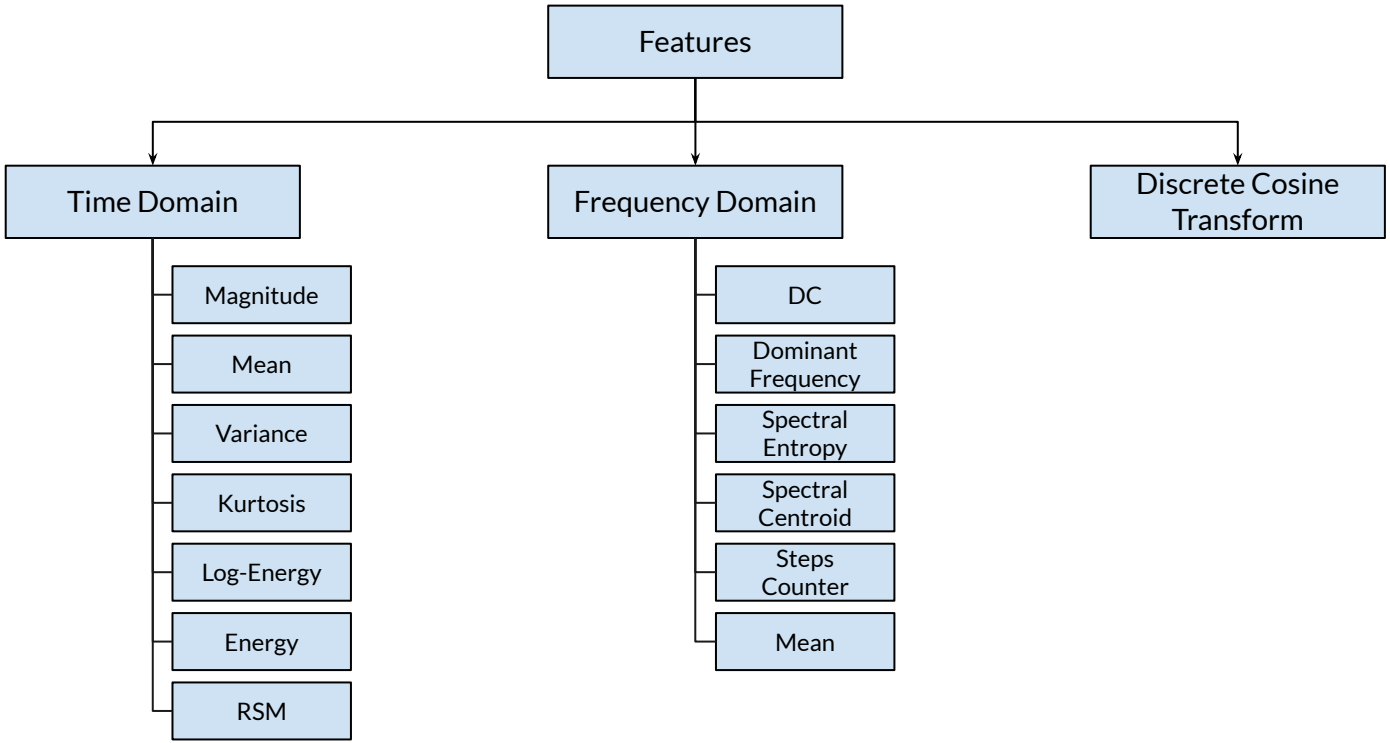
Feature	Description
Time	Time of signal measurement from tri-axial accelerometers.
x	Acceleration in g's along x-axis [-8g to +8g range]
y	Acceleration in g's along y-axis [-8g to +8g range]
z	Acceleration in g's along z-axis [-8g to +8g range]
Class	Activity class -- sedentary, walking, stairs, running



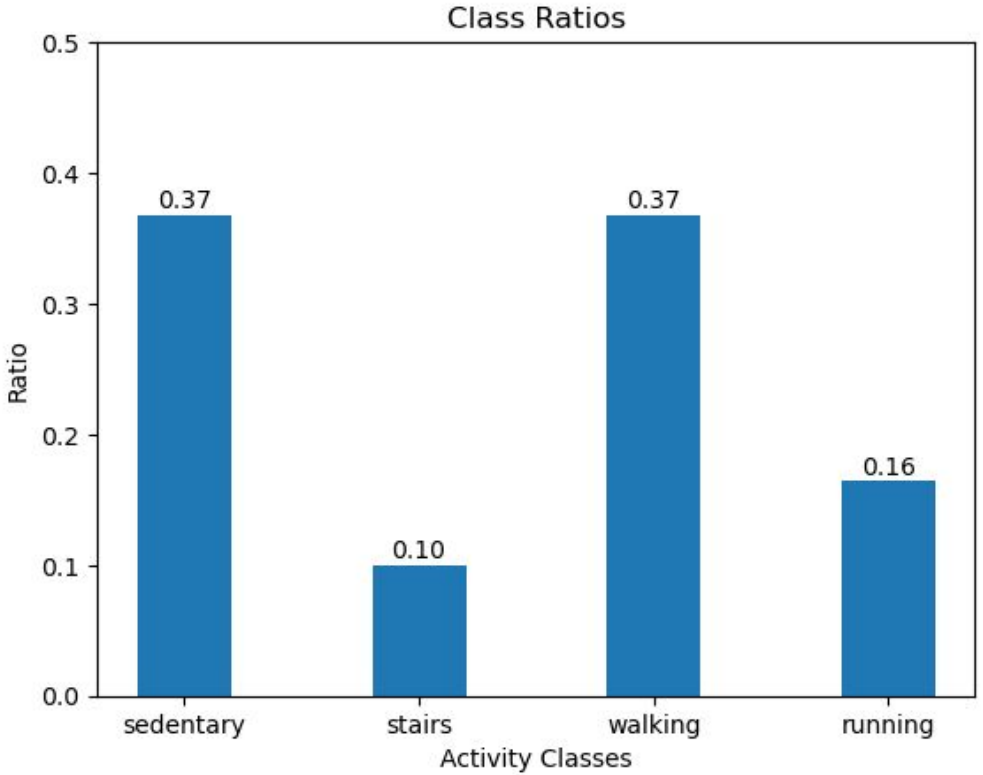
Windowing



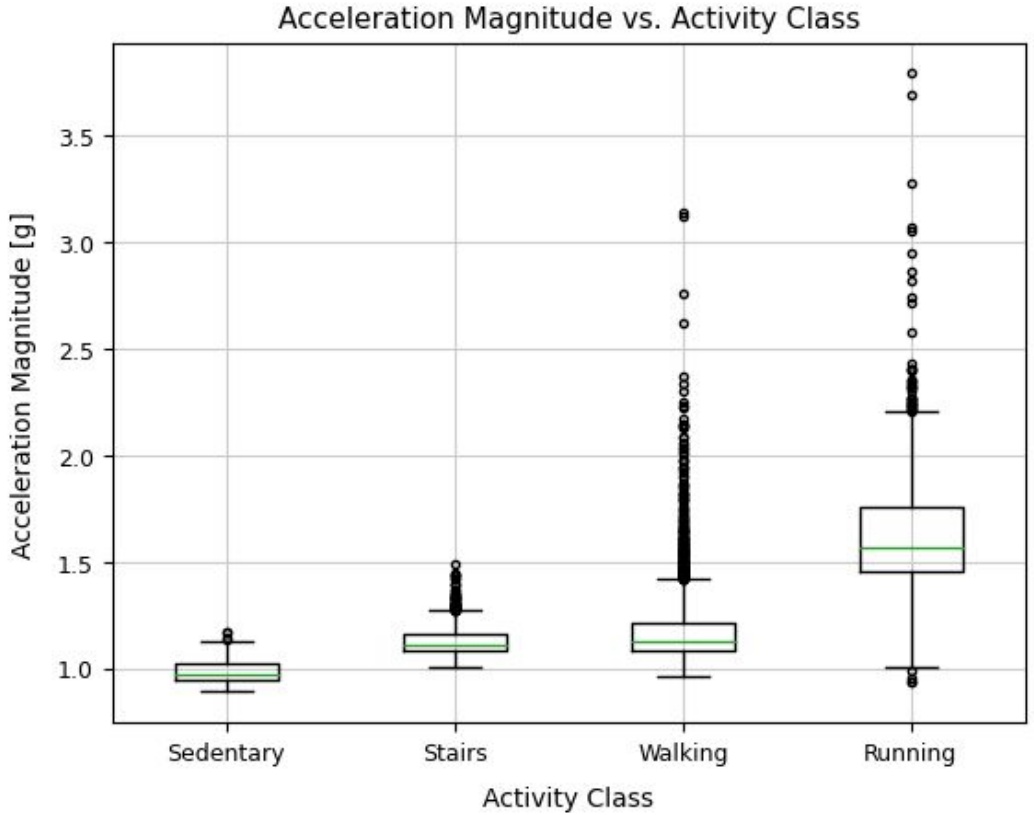
Feature Engineering



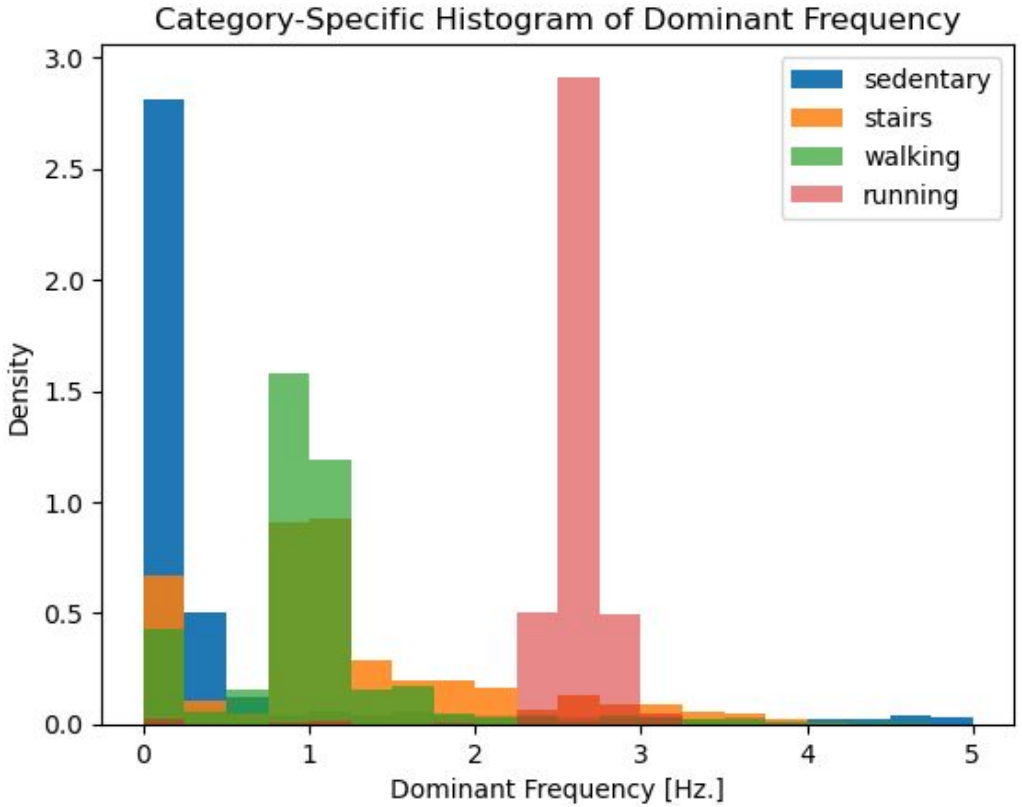
Class Balance



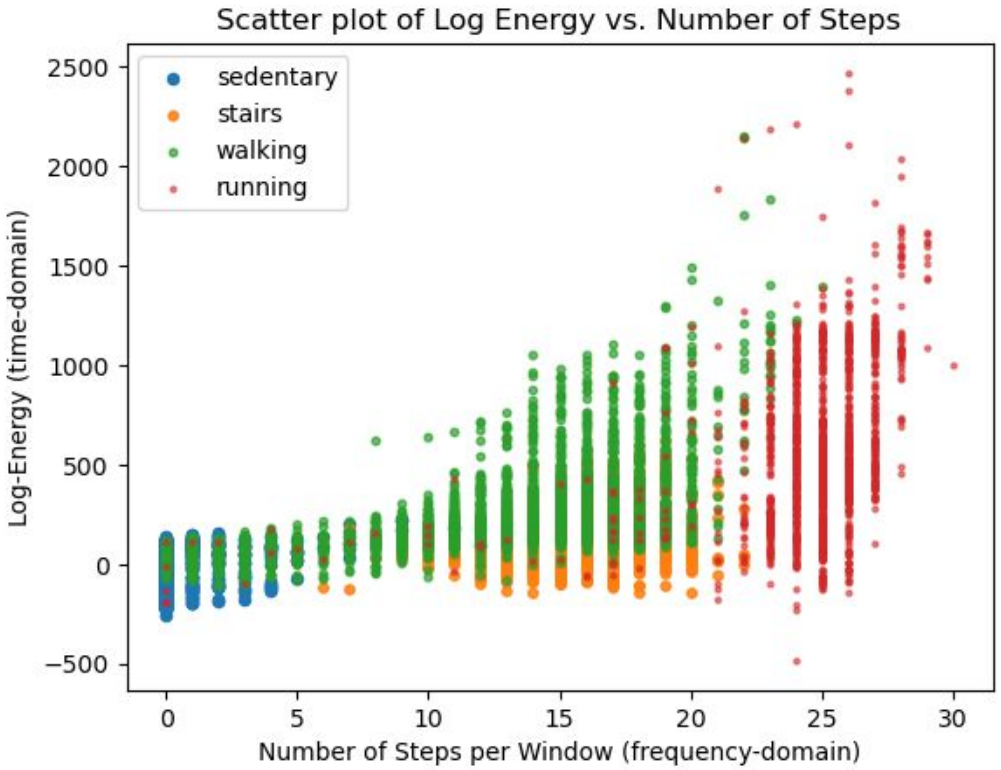
Acceleration increases with increase in activity intensity



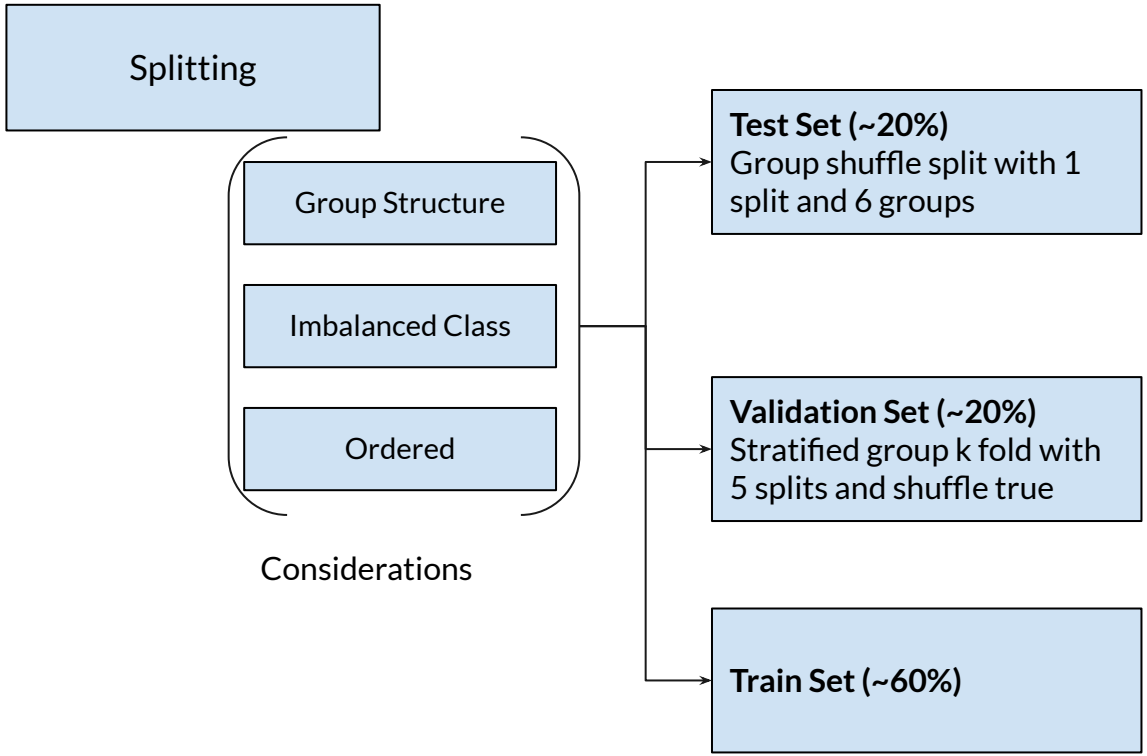
Dominant frequency varies with activity class



Log-Energy vs. Number of Steps



Splitting using Group Shuffle and Stratified K Fold



Impact of Preprocessing

Data State

	Raw Data	After Windowing & Feature Engineering
Size	4.8M rows x 4 features	9.4K rows x 45 features
Missing Values	-	-
Feature types	0 categorical 3 continuous	0 categorical 45 continuous

Apply Standard Scaler on X_train

After Preprocessing
9.4K rows x 45 features
-
0 categorical 45 continuous

Next Steps

- Add features from Discrete Cosine Transform
- EDA for interaction of DCT features with time and frequency domain features
- Identify the appropriate evaluation metrics
- Compare models applicable for multi-class classification
  - Decision Trees
  - Support Vector Machines
  - K-nearest neighbors
- Hyperparameter tuning, ideal window length, window overlap, etc.

Thank You!

Questions/Comments?