Human Motion Data Detection and Classification

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Background

Because of the aging population in Hong Kong, there are more and more elderlies staying at home alone. Once falling happened under this situation, a "long-lie" may occur and it will increase the severity of the injury.

This project aims to reduce the damage to the elderly due to falling by classifying human motion into Falling motion and Activity of Daily Life (ADL).

What is a "long-lie"?

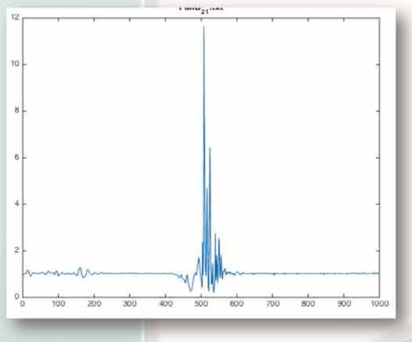
It means that after a falling happened, a person lie on the ground until helps arrive

Methodology

Step 1: Simulations of falling and ADL are performed to collect motion data.

Step 2: Process the data by using MATLAB.

- Data is converted into singed 16bit integer for further analysis.



Step 3: Train the Decision tree model with the processed data.

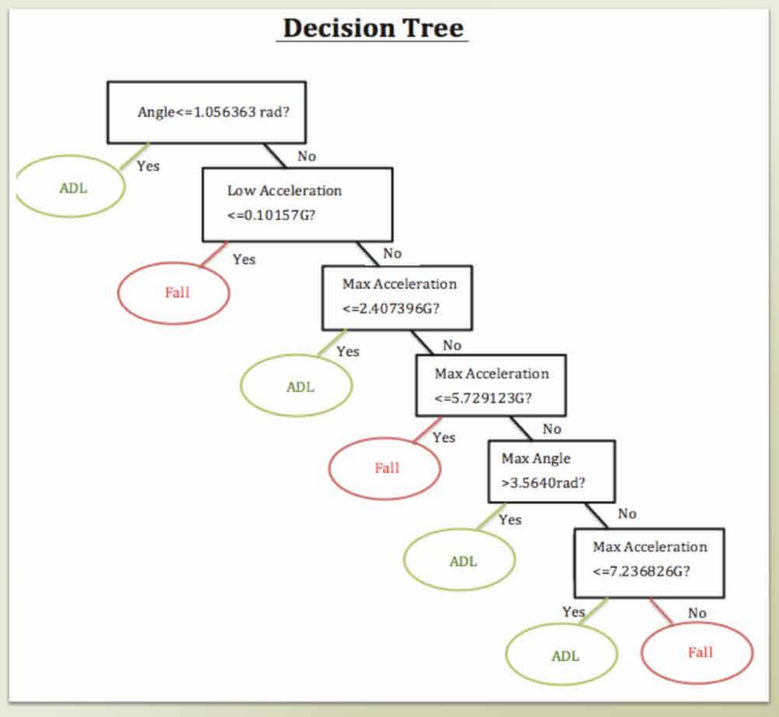
- The following aspects are considered in order to obtain the attributes for the training:

  1. How fast they moved
  2. How much they moved

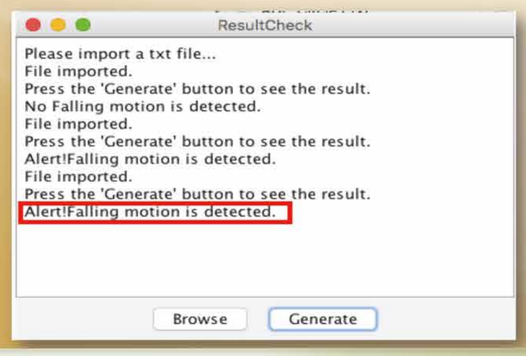
Attributes	Type of attributes
Max angular velocity	Continuous
Max angular acceleration	Continuous
Max change of angle	Continuous
Max acceleration	Continuous
Min acceleration	Continuous

Results

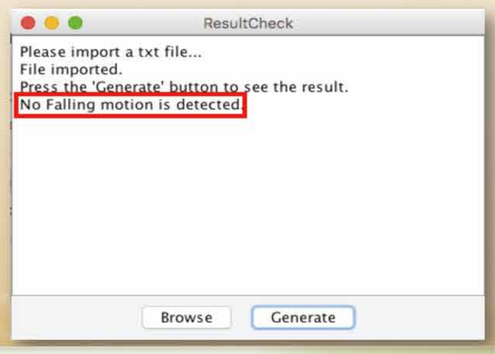
A decision tree is generated from the 139 set of training sets. 7 ADL were misclassified as "fall" in total. 100% of falling motions were identified correctly.



By input these features into the java program, human motion is classified as fall or ADL and output a message to inform the users.



Java Program detected a falling motion



No falling motion is detected