AIOT CODING, ENGINEERING AND ENTREPRENEURIAL SKILLS EDUCATION FOR GIFTED STUDENTS

ELDERLY FALL DETECTION SYSTEM

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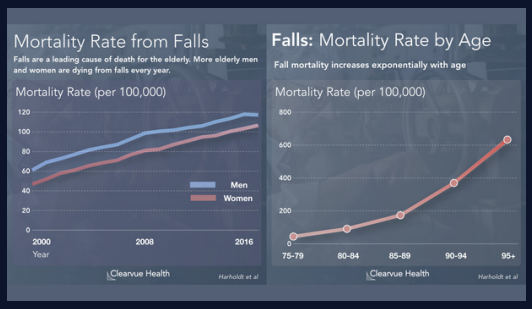
ABSTRACT

This project aims to ensure the safety of elderlies and provide reassurance for their family members. Through utilizing machine learning and sensor technology, we strive to predict the occurrence of a fall to minimize the possible detrimental effects.

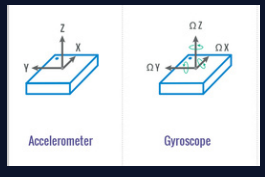
BACKGROUND/MOTIVATION/OBJECTIVE

- Volunteering at elderly homes and personal family experiences of elderlies experiencing injuries due to a fall sparked the idea of this project.
- Due to weaker muscles, poor balance, and long-term diseases, the elderlies are at high risk of falling and potential long term injuries.
- Objectives
  - To optimize the “alert” system
  - To minimize the prolonged harmful consequences of the fall
  - To automatically detect a fall and notify family members regarding the incident

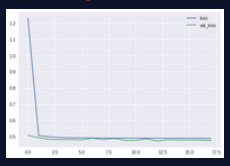


METHODOLOGY

- Research the biomechanics of the human body during a fall
- Import Fall Datasets from Kaggle
- Training the AI model using TensorFlow 2.0
- Utilizing grove IMU 10DOF to acquire input data
  - accelerometer
  - gyroscope



RESULTS/APPLICATION



- AI DNN model
  - one-hot encoding
  - optimizer: adam compiler
  - regularization
  - model evaluation
    - loss: 0.4747
    - accuracy: 0.7711
- Database: 2097150 datasets

Observation: Our DNN machine learning model outputs two values: probability of fall and probability of not fall. Throguh repeated evaluation, our model proves to be relatively accurate and converges to the actual values, showing minimal under/overfitting.

Possible applications: Our system can be used to monitor elderly people, people who are injured and others who live alone.

GITHUB LINK

YOUTUBE LINK

CONCLUSION

In the future, to further refine our product we hope to add additional sensors to increase the accuracy of the system. For example, heart rate and blood pressure sensors, to monitor for sudden spikes in either and further understand the elderly persons health. Other tilt and geometry sensors will also be added to further increase the accuracy. We will also create our product to be in the form of a necklace so that it is both aesthetically appealing and convenient to use.

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