

# Yuning Lei

17yl6@queensu.ca  
(416)854-1257

GitHub:<https://github.com/ray17lei>

## 01

### Autonomous Driving Robot

Applied Object Detection algorithm (Single Shot Detector) on a mobile robot which is powered by Nvidia imbedded system to achieve object following.

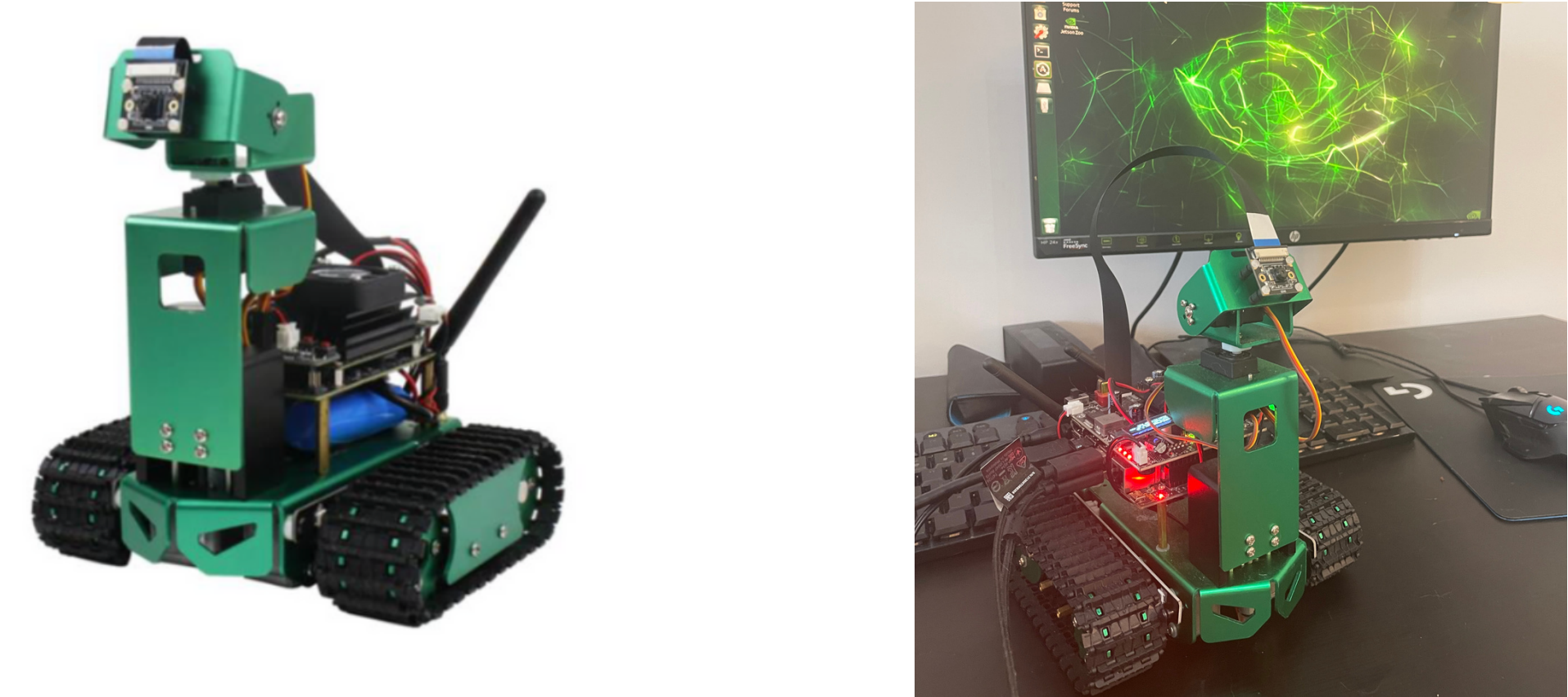


Figure 1 & 2: Outlook of the Mobile Robot

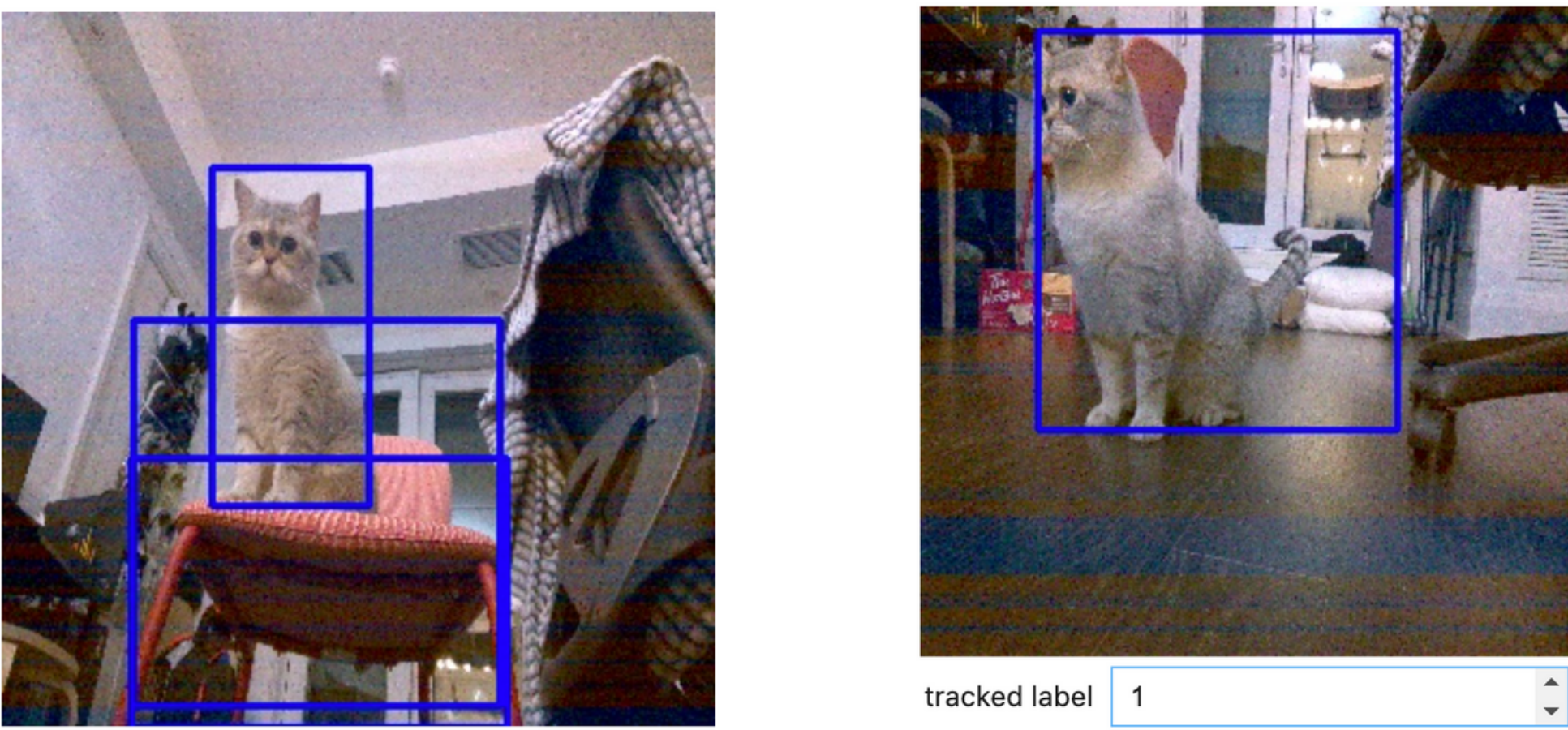


Figure 3 & 4: Output from Object Detection Algorithm (bounding box and class label)

### Highlights

- Applied **MobileNet V2**, **TensorRT** and **CUDA** to improve the speed of detection algorithm
- Implanted **PID control system** into the robot to improve the smoothness
- Leveraged **threading** to continuously load the detector in order to minimize the delay
- Robot Autonomous Features:
  - 1.Able to followobject while avoiding obstacles
  - 2.Can adaptively adjust speed based on distance from the target.

## 02

### AI and Interactive System

Developed a deep learning model which combines the **Convolutional Neural Network (CNN)** and **LSTM (C-LSTM)** by using **TensorFlow** with Python to predict various activities from time-series data recording by accelerometer. This project was built based on public paper with self improvement

### Highlights

- Preprocessed the data including data parsing, removing redundant information, data balancing and normalization
- Combined CNN and LSTM layer to boost the accuracy from 85% to 93%

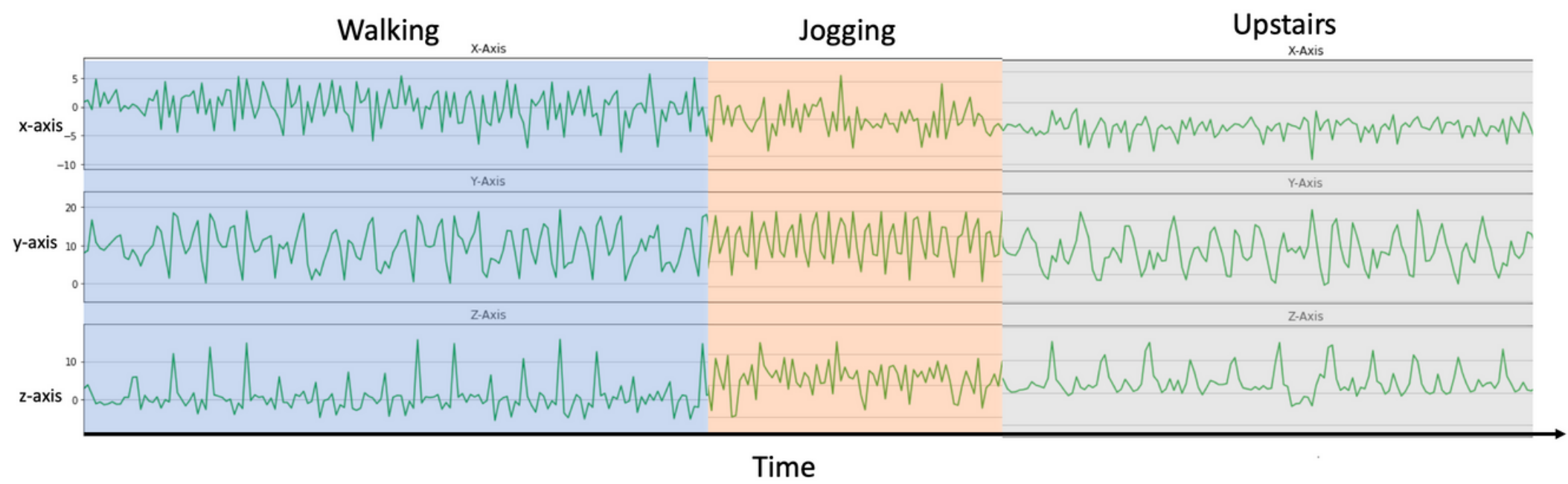


Figure 5: Time-series Data from Accelerometer

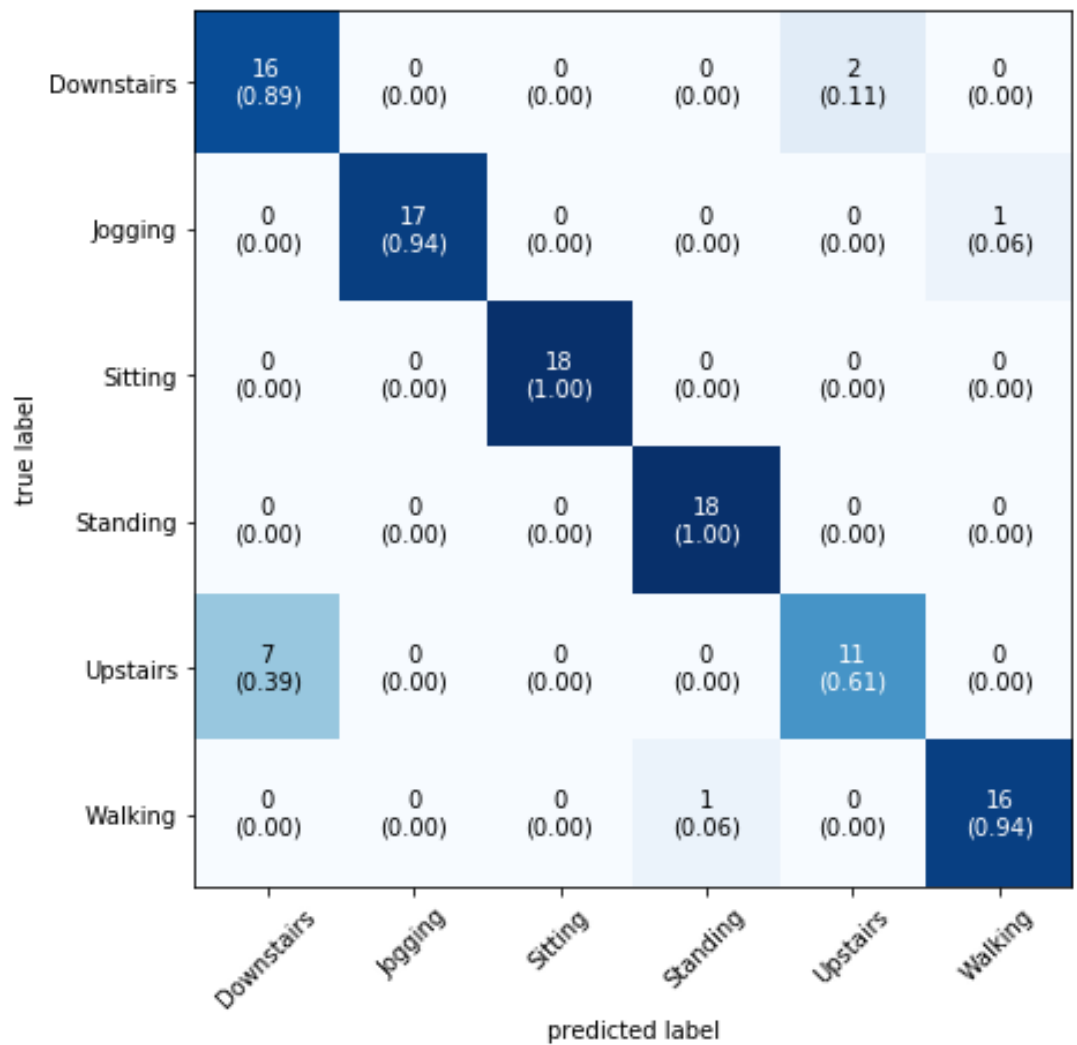


Figure 6: Confusion Matrix from Prediction Result

## 03

### Continual Learning on Aspect Sentiment Analysis

Researched on Elastic Weight Consolidation, GAN-based and BERT-based continual learning models on Aspect Sentiment Classification using real customer reviews on 19 different products like smartphone, camera, and TV

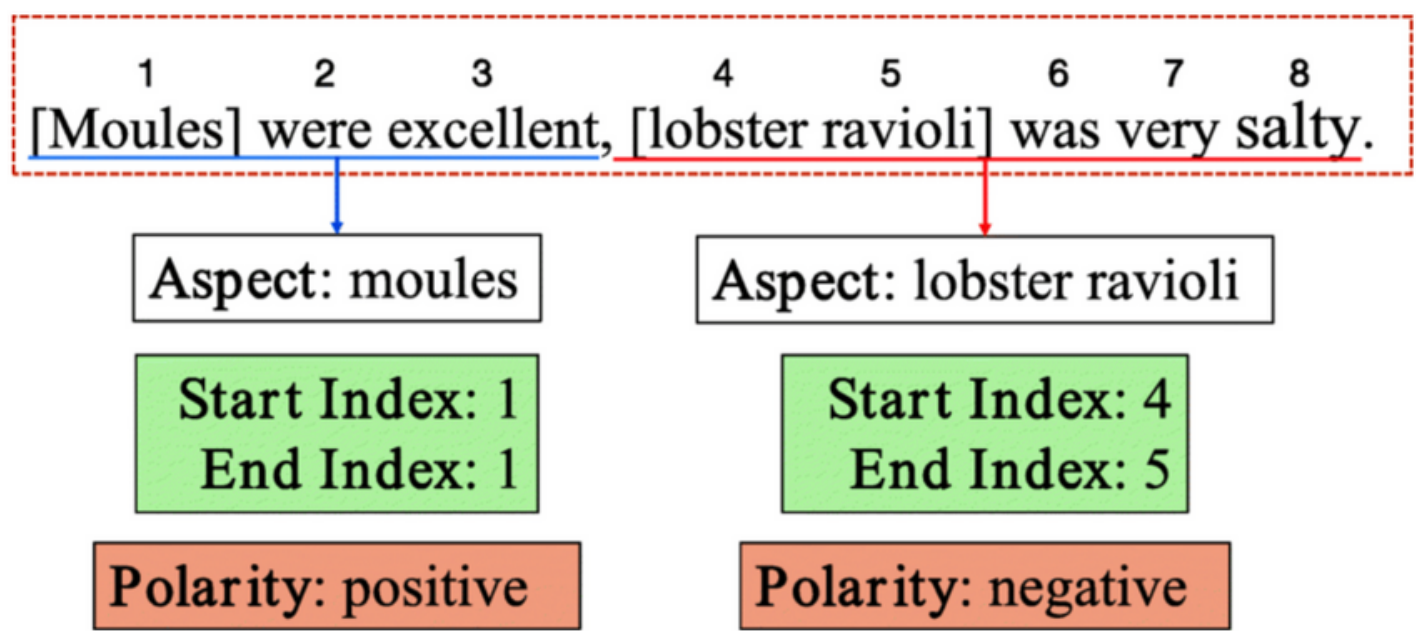


Figure 7: Aspect Sentiment Analysis Example

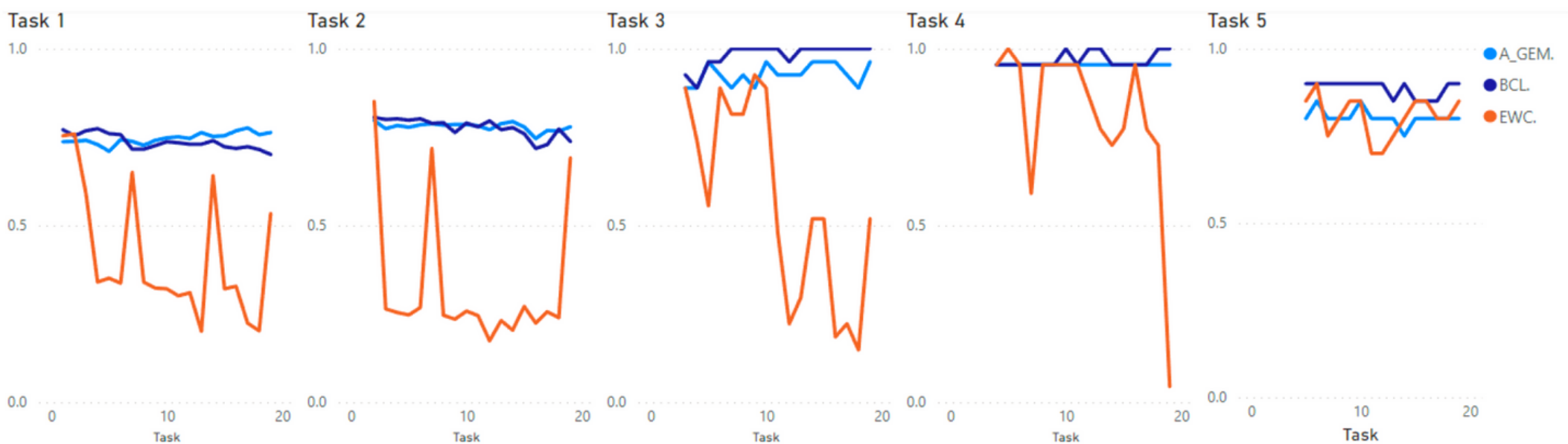


Figure 8: Accuracy Changes of each Task in the Training