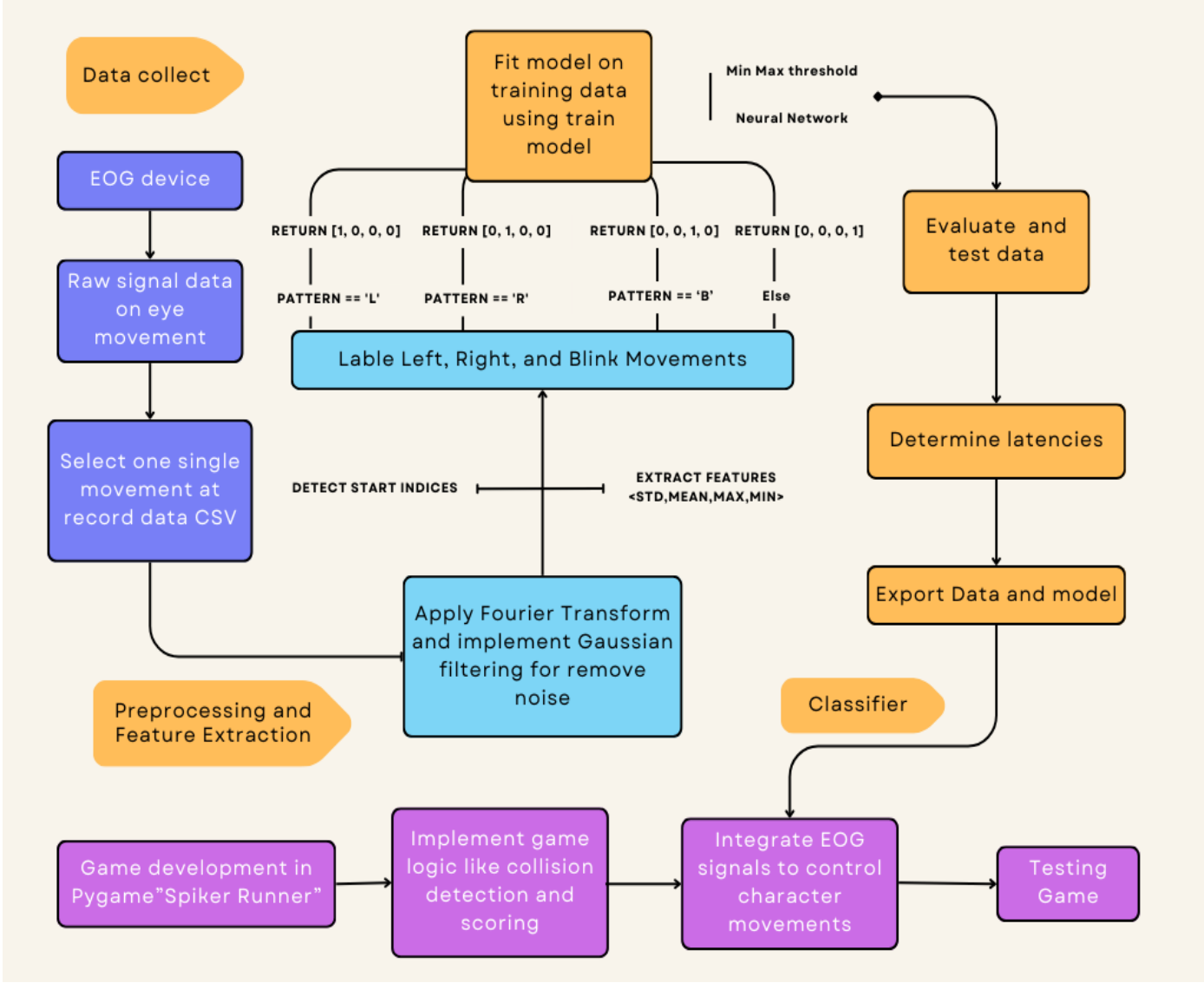
Spiker Runner

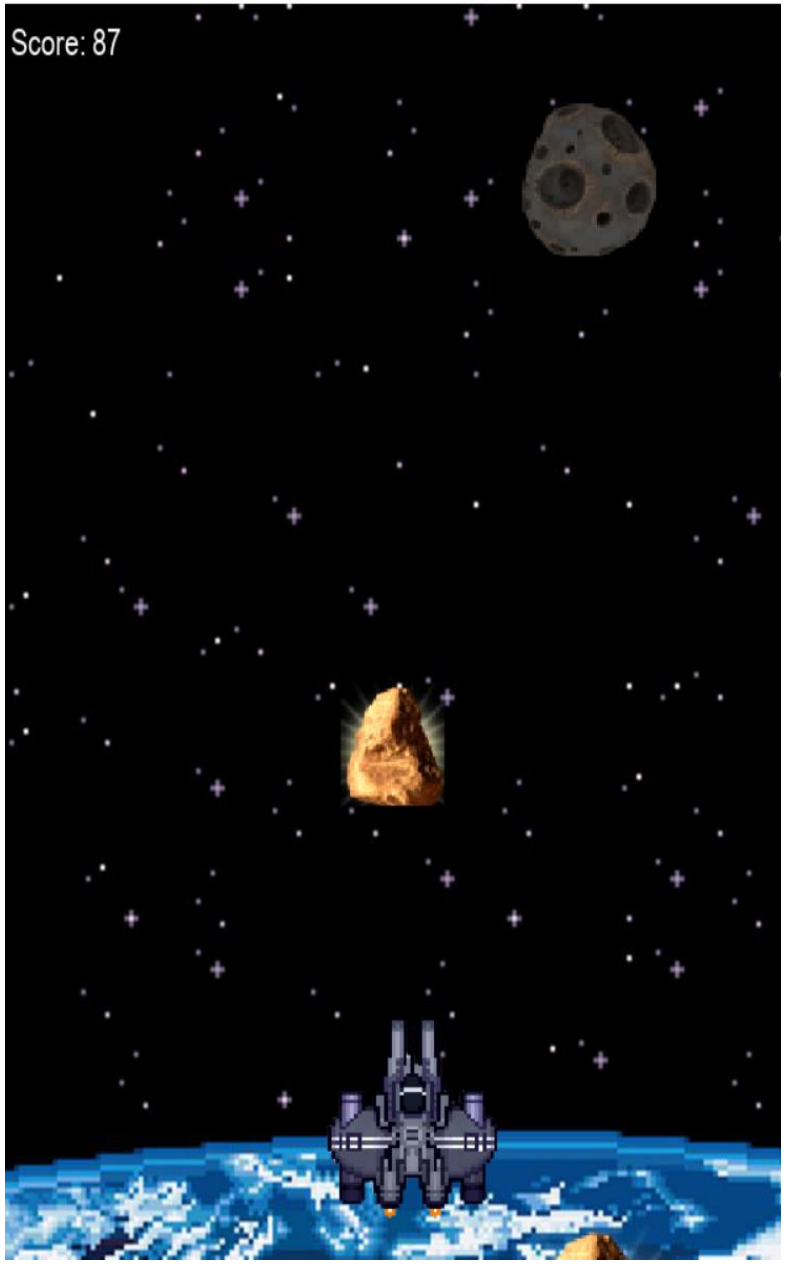
Innovation of the brain

Outline of the plan

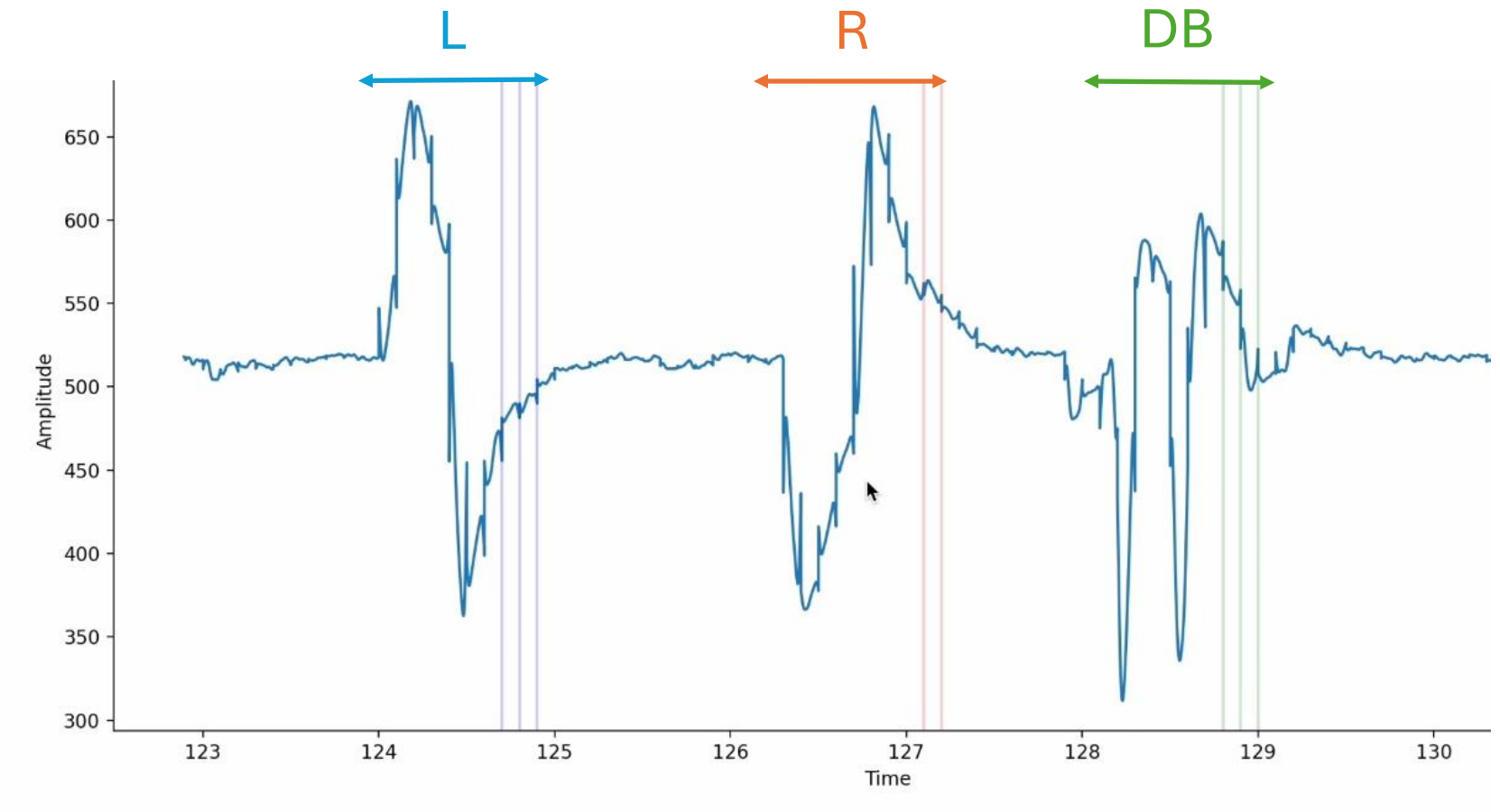


The Game

- Arcade-Style Game
- Space Themed
- Randomly Generated Objects
- Controlled through Spiker Box



Introduction to the Problem



L: Left

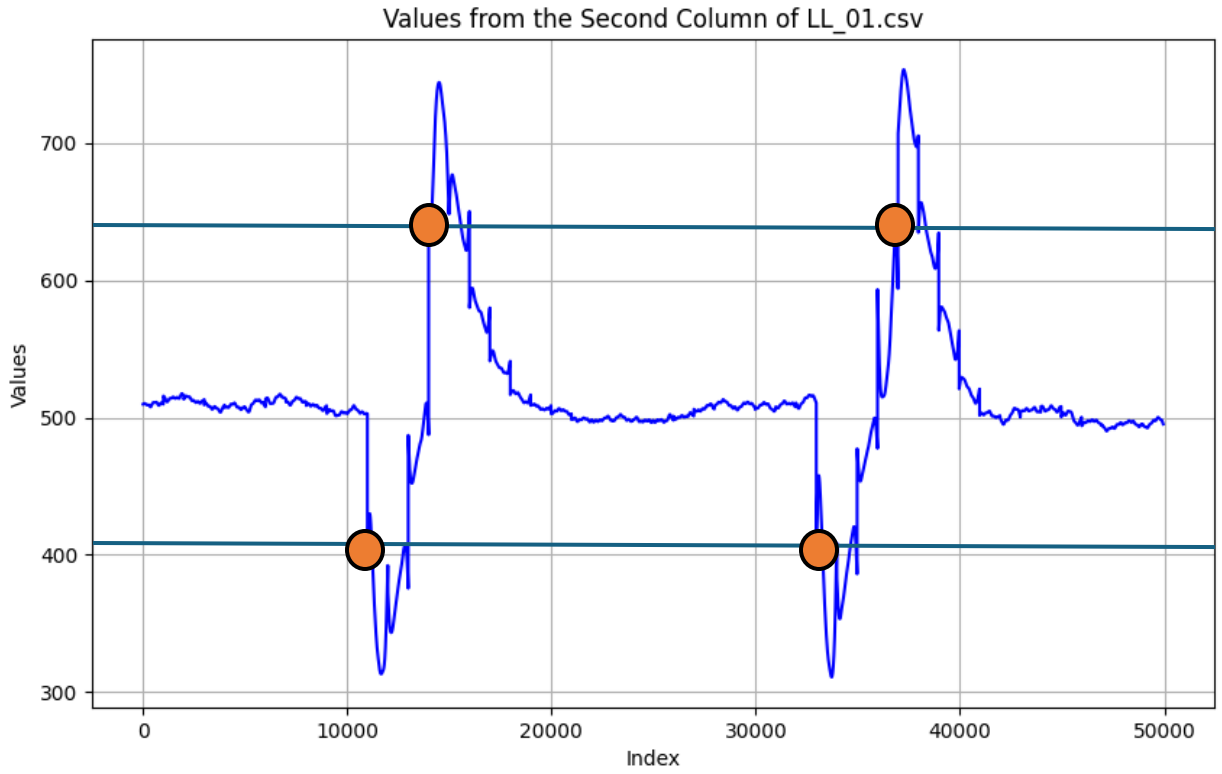
R: Right

DB: Double blink


Meet the Classifiers

Simple Classifier (Min/Max)

- Parameters set:
  - Mean of the non-event readings
  - Independently set each threshold according to intensity observed
- Window size:
  - Based on our samples and fine tuning
- Dominant signals

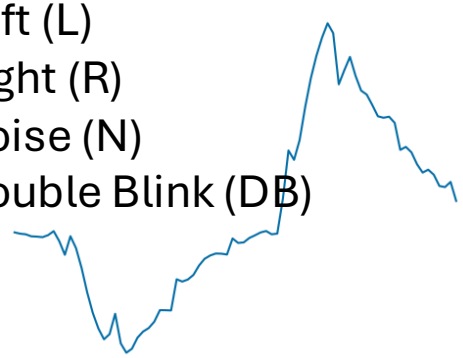


Multi-Layer Perceptron

- Simple Neural Network
- Challenge:
  - Making representative data
- Advantages:
  - Identifies complex patterns
  - Continuous probability

120 Samples total:

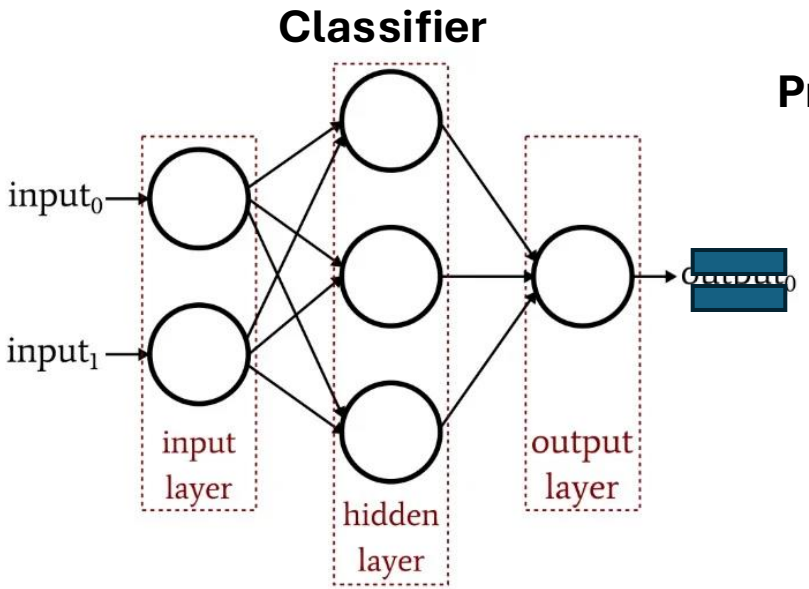
- Left (L)
- Right (R)
- Noise (N)
- Double Blink (DB)



1. Down sample
2. Noise
3. Label

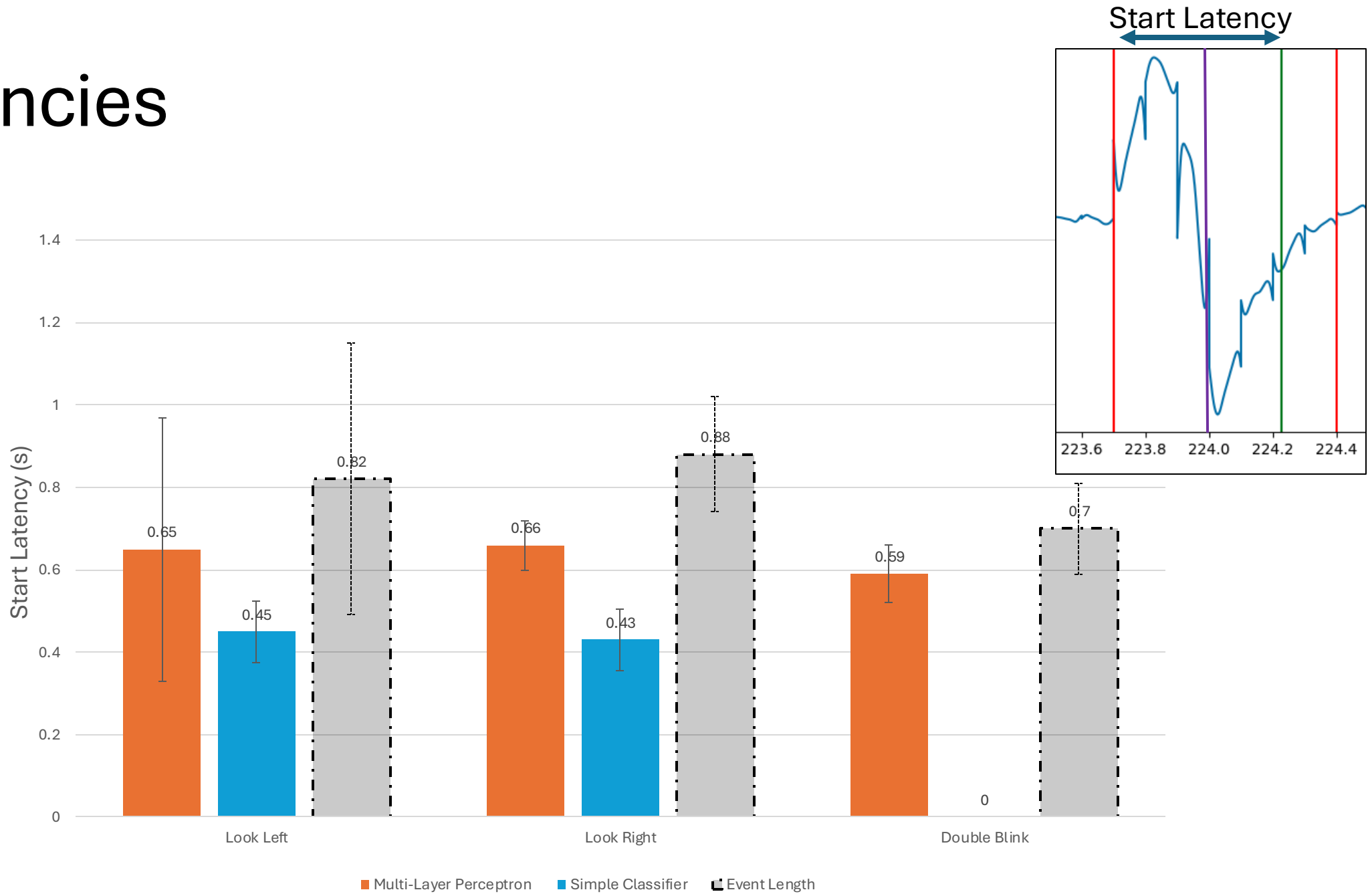
Classifier Parameters:

- Input layer, 100 nodes, Tanh
- 3 Hidden Layers, 64 nodes, Relu
- Output layer, 4 nodes, Softmax



Discussion

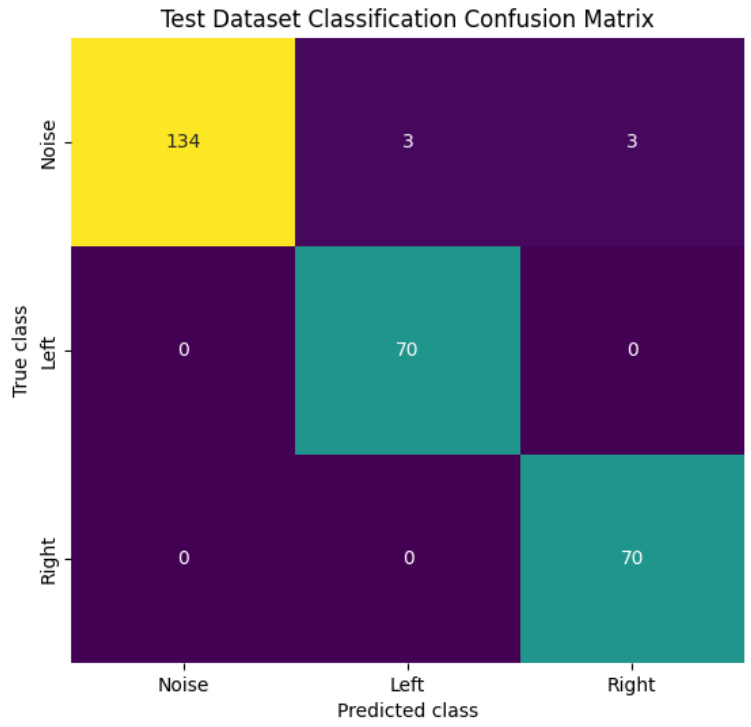
Latencies


Start Latency
223.6
223.8
224.0
224.2
224.4
Start Latency (s)
1.4
1.2
1
0.8
0.6
0.4
0.2
0
0.65
0.45
0.82
0.66
0.43
0.88
0.59
0
0.7
Look Left
Look Right
Double Blink
Multi-Layer Perceptron
Simple Classifier
Event Length

Classifier Accuracy

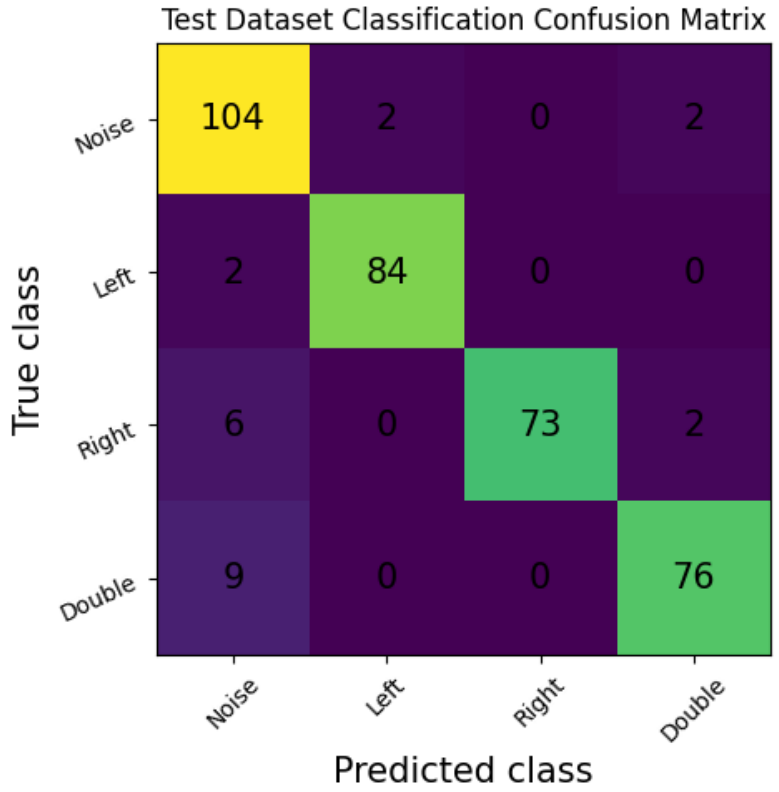
Simple Classifier

Test Accuracy: 97.9%



Multi-Layer Perceptron

Test Accuracy: 94.7%

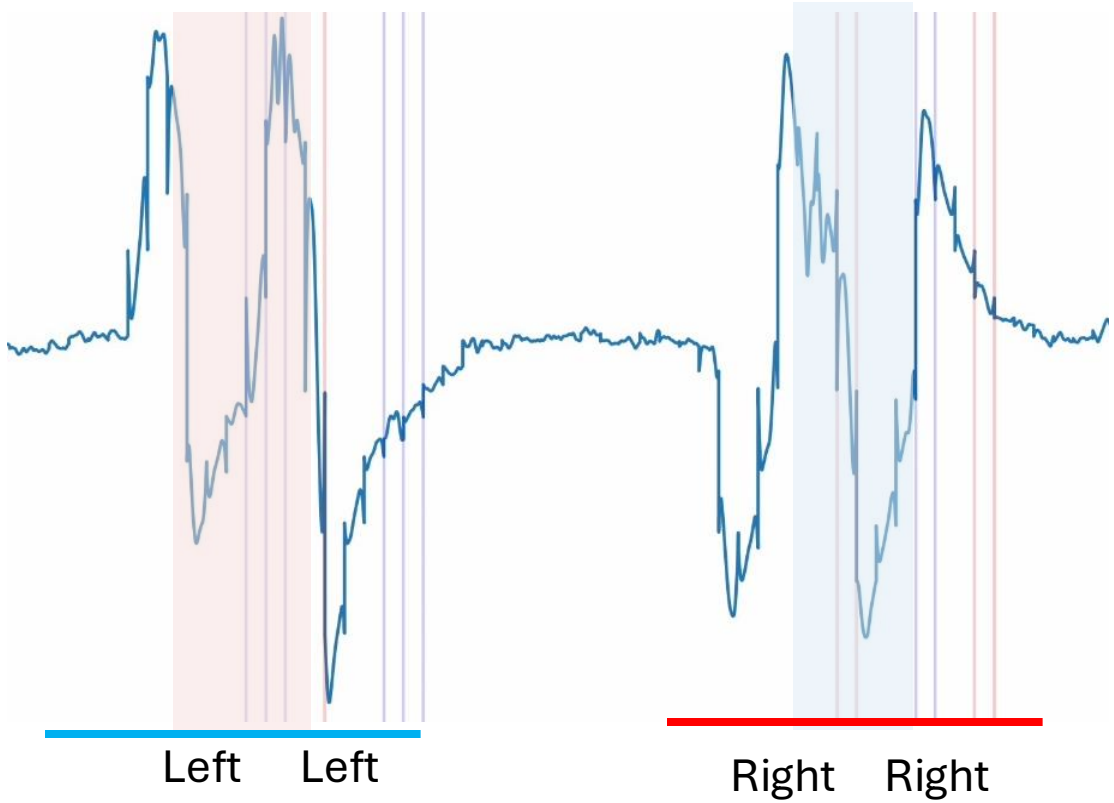


Major Limitations

Simple Classifier

Inability to differentiate double blinks

Both Classifiers



Multi-Layer Perceptron

Perceivable amount of latency

Conclusion & Further Improvements

Simple Classifier
Event Detection
+
Multi-layer Perceptron

Combine the latency and flexibility of the models

Gaming and More

- Inclusive gaming
- Cognitive stimulation
- Recovery from injuries and neurological conditions

Live Demonstration