Weekly Work Report 11/1/2024

**Response to Last Week’s Feedback:**

* Apply other models from the paper in the same way they applied, specifically: window size, using the temporal signals not summary, using same channels: frequency bands
* Try to use Fully Connect Layers, 3 layers, using summary features,

**This Week:**

* **4 models are used for classification.**
  + **Classification of Impasse vs. Non-Impasse Moments**
  + **Classification of Aha! vs. Non-Aha! Moments**
* **ROC Curve, Percision\_Recall Curve**

**Task:** classify EEG signals into different states **(Rest state or Task State)**

**Input:**

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Input Shape: (72, x, 21, 500); where x is inconsistent

* 72: samples / subjects \* 2 states
* x: is inconsistent
* 12: channels
* 500: time points / epoch (window size = 1s) / sampling frequency

This shape corresponds to (samples/subjects, segments/trials, channels/electrodes, time points/samples per segment)

My input Shape: (?, x, 16, 125)

**Features:**

Feature extraction:

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**Modeling and Classification**

* **EEGNet:** A compact convolutional neural network tailored for EEG signal classification.
* **Tsception:** A temporal convolutional neural network designed for time-series data.
* **ATCNet:** Attention-based Temporal Convolutional Network focusing on important time-series features.
* **LSTM RNN:** A Long Short-Term Memory Recurrent Neural Network to capture temporal dependencies in the EEG signals

**Result**

**Impasse vs Rest**

* **EEGNet**

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A graph with a red line and a blue line

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* **TSCeption**

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A graph of a curve

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* **LSTM RNN**

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A graph of a curve

Description automatically generated with medium confidence

* **Result Table**

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**Aha vs Rest**

* **EEGNet**

**A screenshot of a computer

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A graph with a red line and a blue line

Description automatically generated

* **TSCeption**

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* **LSTM RNN**

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A graph with red line and white text

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* **Result Table**

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**Impasse (0) vs Aha (1)**

* **EEGNet**

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A graph with a red line and a blue line

Description automatically generated

* **TSCeption**

**A screenshot of a graph

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A graph of a positive rate

Description automatically generated with medium confidence

* **LSTM RNN**

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* **Result Table**

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Best Result:

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**FCNN: Summary features only**

**Impasse vs Rest**

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A graph of a curve

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**Aha vs Rest**

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A graph of a curve

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**Aha vs Impasse**

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A graph of a curve

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**Overall Result**

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**Next Week:**

* Finish processing additional signals, including EDA and pupil data.

**Next Month:**

* Compare Aha!/Impasse classification using
  + physiology signals
  + EEG
  + physiology signals + EEG

**Final Goal:**

* Explore the dynamics of **Attention**, **Impasse**, and the **"Aha!"** moment.