

Camp QMIND

2024

EEG - Emotion Recognition
NLP Node



Our Team



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Daryan & Noah

Not here today :(

Problem & Motivation

EEG signals are **noisy**

Limited signal resolution

Difficult to **infer** from signals alone

Temporal **AND** spatial data

Transfer learning of EEG signal classification can be widely applied

Use cases in healthcare, gaming, psychological research, etc.

Dealing with low resolution data can make applications more **accessible**

Existing Solutions



Convolutional Neural Networks (CNN)

Strong in image classification and leveraged for use in EEG



Support Vector Machines

Classifies EEG data into emotional states through finding the optimal plane to separate results



Long Short-Term Memory Networks (LSTM)

Finds temporal dependencies in data for effectiveness in tracking changes in emotional states overtime



Domain Knowledge

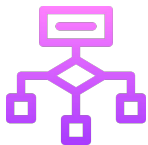
Doctors can analyze results based on medical knowledge

Proposed Solution



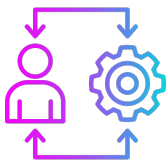
Dataset

- **Emotion Recognition** using **EEG** and **computer games**
- **28 Subjects** gathering Raw/Preprocessed EEG data from Emotiv Epoc+(14 channel device)
- 20 minutes of **four emotionally diverse games** measuring boring, calm, horror, funny.
- Recognize emotions while wearing an EEG



Algorithm

- **Preprocessing** data, cleaning, visualizing, etc..
- Use **CNN's** to capture localized patterns in EEG channels
- **SVM's** for emotional classification



Approach

- Filtering noise/remove unwanted behaviour such as blinking
- **Optimize** model on training dataset
- Use our EEG on ourselves to **validate** model with original dataset as a benchmark
- Capture data **quickly** after use to determine emotions throughout playthroughs

Timeline

01

Phase 1: Initial Research & Problem Definition

Consult specialists and determine where progress can be made

02

Phase 2: Model Development & Dataset Selection

*Choose, analyze and clean dataset
Determine some potential models
(CNN, SVM, RNN, etc.)*

03

Phase 3: Testing & Evaluation

*Develop models and test accuracy of classifications
Use our own data to validate*

04

Phase 4: Refinement & Finalization

*Determine best model and justify why
Live case study*



Impact

Understanding and achieving accurate EEG classification is not only applicable to life-saving areas, but also paves the way for a new era of tech - the future of communication.



Healthcare



Gaming



Research

