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[ **Idea 3: EOG based interface ]**

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***Team* (32) SC**

***HCI Project***

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**Idea of Project:**

If we have an **EOG signal**, it is a signal of eye movements up, down, right, left, or blink and we want to use it to set up specific tasks so that The UI should enable the user to choose whether to sleep, eat, drink water, or go to the bathroom by UI Design.

**Dataset:**

We have 278 file and we have 5 Classes:

Yukari --> Up

Asagi --> Down

Sag --> Right

Sol -->Left

Kirp -->Blink

**1-Data preparation and Preprocessing:**

Data Preparation:

* The dataset is reading manual
* The dataset is split into training and testing sets using the train\_test\_split function from the sklearn library.
* The training data is used to fit the model and the testing data is used to evaluate the model's performance.

Preprocessing:

* We've read files that contain only h and v in their name for same number of signal and neglected anything else .
* Then we took the files and used the band pass filter
* The dataset is scaled using the StandardScaler function from the sklearn library which standardizes the features by removing the mean and scaling to unit variance.

We Use This Techniques to Clean Data and Preprocessing Text:

* Remove Rows Have Nulls Cells.
* Removing Duplicate Rows.
* Label Encoder.

**2- Feature extraction methods:**

1. The feature extraction method used is Principal Component Analysis (PCA) which is a dimensionality reduction technique.
2. The number of principal components used is determined by setting the n\_components parameter of the PCA function.

**3- Classification Models:**

* **KNN:**
* **Support Vector Machine Classifier** **(SVM) algorithm:**
  + The parameters used for the SVC classifier are: kernel='rbf', C=1.0, and gamma='scale'.

SVM is a supervised machine learning algorithm that can be used for both classification and regression tasks. SVM works by finding the best boundary or hyperplane that separates the data points of different classes with the maximum margin. The margin is the distance between the hyperplane and the closest points from each class.

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* **Random Force:**

**4- Classification results:**

1. **KNN**
2. **Support Vector Machine Classifier Classification Results:**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Precision | Recall | F1-Score | Support |
| 0 | 0.70 | 0.91 | 0.79 | 178 |
| 1 | 0.75 | 0.41 | 0.53 | 96 |
| Accuracy |  |  | 0.71 | 274 |
| Macro Avg | 0.72 | 0.66 | 0.66 | 274 |
| Weighted Avg | 0.71 | 0.71 | 0.68 | 274 |

1. **Random Force**

**5- UI:**

**Thank You :)**