# Emotion Classification for SEP CV&DL Preliminary Report

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## Abstract

*The ABSTRACT* [1].

*Briefly introduce the concept of emotion detection and its significance in various domains. Approach and goals in final project.*

## 1. Introduction

Provide an overview of the different modalities used for emotion detection, such as facial expressions, speech, text, and physiological signals. Highlight the challenges and limitations of existing emotion detection techniques.

Figure 1 depicts an overview of our time schedule for the final project.

The structure of this report is arranged as follows. Section 2 contains the related work of our research. Section 3 provides the datasets we used, the model architecture, and preliminary evaluation results of our model.

## 2. Research Objective

Clearly define the specific research objectives of the work. Outline the goals of the study, including emotion recognition accuracy, robustness to variations, and ability to handle complex emotional expressions in picture and video. Specify the target applications or domains where the emotion detection system will be deployed.

## 3. Approach

### 3.1. Dataset Aquisition and Processing

Firstly, for all the image data from the training dataset [1, 2], we filter out neutral instances from the original dataset, the emotion labels are denoted as 1 (Surprised), 2 (Fearful), 3 (Disgusted), 4 (Happy), 5 (Sad), and 6 (Angry) for simplicity. Afterward, we transform and resize the images to `(64,64)`.

[1]Equal contributions listed by alphabetical order of surnames, see Sec. 11 for details.

Describe the data collection methods employed, including the datasets used, the acquisition procedures, and the annotation standards.

#### 3.1.1 Pictures and Labeling

#### 3.1.2 Video Processing

#### 3.1.3 Augmentation

### 3.2. Model Implementation

#### 3.2.1 Training Infrastructure

#### 3.2.2 Model Architecture

We implemented an emotion-classification model with 3 convolution layers.

#### 3.2.3 Model Training and Validation

We add a `dropout` layer to prevent overfitting. In order to find the best hyperparameter configuration (see Tab. 1 for details) of the model, we utilize the parameter grid from sklearn [2].

| Hyperparameter | Configuration |
|---|---|
| Learning rate | {0.1, 0.01, 0.001, 0.0001} |
| Batch size | {8, 16, 32, 64} |
| Dropout rate | {0.5} |
| Epoch | {20} |
| Early stopping | {`True`, `False`} |
| Patience | {5} |

Table 1. Explored hyperparameter space for our model

For evaluation, we use the metric accuracy.

Explain the emotion detection techniques adopted, including the algorithms, models, and machine learning approaches used. Model training with GPU (Tanja, Leah, Ji-

[2]https://scikit-learn.org/stable/modules/generated/sklearn.model_selection.ParameterGrid.html

awen, Mahdi, 15.Jan) Model testing acc (Jiawen, 15.Jan) Elaborate on the experimental setup and evaluation criteria, including the performance metrics used to assess the accuracy and effectiveness of the system.

### 3.3. Explainable AI

#### 3.3.1 CAM-Images (Mahdi)

#### 3.3.2 Heatmap (Mahdi, Leah)

#### 3.3.3 CAM-Videos (Tanja)

#### 3.3.4 Video Green-Square (Leah)

#### 3.3.5 Predictions .csv (Tanja)

## 4. Preliminary Results

Present the preliminary results obtained from the experiments, including emotion recognition accuracy for different emotions and across different modalities. Analyze the ability of the system to capture complex emotional expressions and identify mixed emotions.

## 5. Optimization Strategy

### 5.1. Model Fine-Tuning

Discuss the performance of the system in handling model variations.

### 5.2. Variable Approaches on Data Processing

Discuss the performance of the system in handling variations in model features.

## 6. Presentation

Presentation 08.02.24 Focus in Demonstration, planned Resultpresentation

## 7. Report

Report 08.02.24

## 8. Time Schedule

## 9. Discussion

Identify potential areas for improvement and future research directions. Discuss the implications of the findings for the development of more accurate and effective emotion detection systems.

## 10. Conclusion

Summarize the key findings of the preliminary study. Restate the research objectives and emphasize the overall progress achieved. Highlight the potential applications and impact of the research. Propose future research directions to address remaining challenges and advance emotion detection technology.

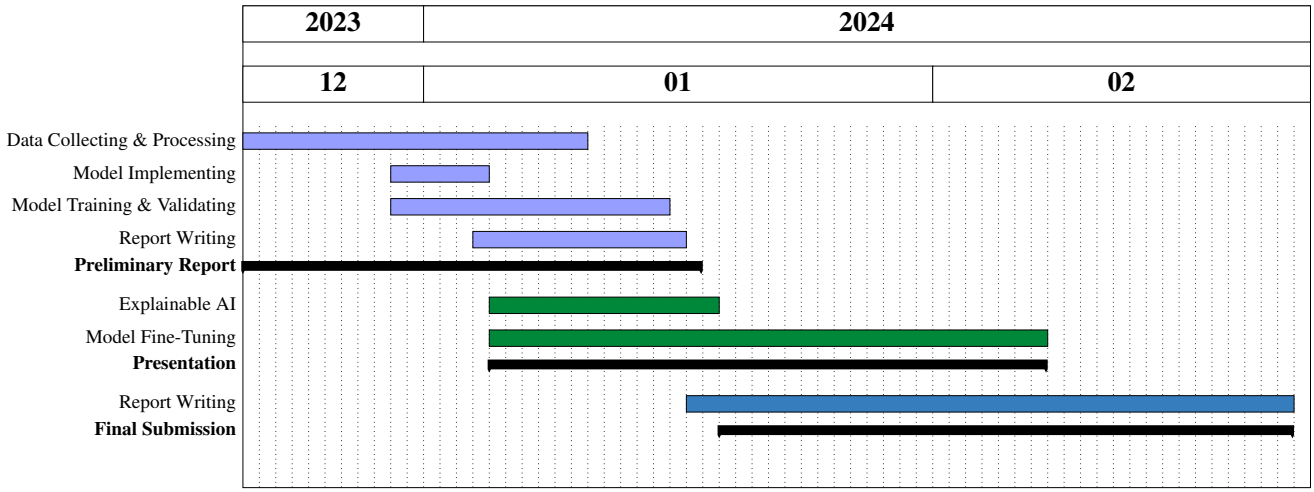


Figure 1. Overview of the time schedule for the final project

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Supplementary Material

## 11. Author Contributions

Every author did the literature research and contributed to the writing of the paper.

- **Tanja Jaschkowitz**
- **Leah Kawka** Dataset collection, dataprocessing, implemented augmentation, Explainable AI & Video-green square, Paper structure
- **Mahdi Mohammadi**
- **Jiawen Wang** implemented the model architecture, training infrastructure, and optimization strategies.


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## References


[1] Shan Li and Weihong Deng. Reliable crowdsourcing and deep locality-preserving learning for unconstrained facial expression recognition. *IEEE Transactions on Image Processing*, 28 (1):356–370, 2019. 1

[2] Shan Li, Weihong Deng, and JunPing Du. Reliable crowdsourcing and deep locality-preserving learning for expression recognition in the wild. In *2017 IEEE Conference on Computer Vision and Pattern Recognition (CVPR)*, pages 2584–2593. IEEE, 2017. 1