

# Comparing Emotion Detection Using SVN and CNN

Ahmet Emre Sağcan 150119042

Yusuf Taha Atalay 150119040

**Abstract:** Our project aims to compare the performance of Support Vector Machines (SVM) and Convolutional Neural Network (CNN) algorithms in detecting emotions from facial expressions using the FER-2013 dataset consisting of 35,685 labeled facial images. We have conducted a literature survey to study related works and preliminary results suggest that CNN outperforms SVM in accuracy, while SVM is faster and more robust to noisy data. Our focus is on evaluating the accuracy, speed, and robustness of both methods and we will implement and fine-tune both models on the dataset to perform a detailed analysis of their performance. It is important to note that our scope is limited to static images only.

## What We Have Accomplished So Far:

**a. Literature survey:** We conducted a comprehensive literature survey to understand the emotion detection using SVM and CNN methods. We studied relevant research papers, books, and online resources to gain a thorough understanding of the field.

**b. FER-2013 dataset exploration:** We explored the FER-2013 dataset and identified its key features and characteristics. We analyzed the dataset in terms of its size, distribution of emotions, and quality of images.

**c. Implementation of baseline models:** We implemented baseline SVM and CNN models using Python and Keras libraries. We trained these models on the FER-2013 dataset and evaluated their performance using accuracy and F1-score metrics.

## Remaining Work:

**a. Fine-tuning the models:** We plan to fine-tune the SVM and CNN models by adjusting their hyperparameters and optimizing their performance on the FER-2013 dataset. We will also experiment with different pre-processing techniques to improve the quality of the images.

**b. Performance analysis:** We will perform a detailed analysis of the performance of the SVM and CNN models in terms of accuracy, speed, and robustness. We will also compare their performance on different subsets of the FER-2013 dataset.

**c. Results interpretation:** We will interpret the results obtained from the SVM and CNN models and draw conclusions about their relative strengths and weaknesses. We will also identify areas for future research and improvement.

## Revised Project Plan:

1. **Mid-Term Report (May 8)**
2. **Fine-tuning the SVM and CNN models (May 22):** We aim to optimize the performance of the SVM and CNN models on the FER-2013 dataset by fine-tuning their hyperparameters and experimenting with various pre-processing techniques to enhance image quality.
3. **Performance Analysis and Results Interpretation (May 29):** Our project will involve a comprehensive evaluation of the SVM and CNN models, where we will analyze their accuracy, speed, and robustness on the FER-2013 dataset. We will compare their performance on different subsets of the dataset and interpret the results obtained from both models to draw conclusions about their strengths and weaknesses. Additionally, we will identify potential areas for future research and improvement.
4. **Final Project Report (June 5)**
5. **Presentations (June 5-8)**

## **List of References:**

<https://github.com/amr4i/EmotionDetection>

<https://dergipark.org.tr/tr/download/article-file/1500483>

<https://web.eece.maine.edu/~zhu/book/lab.php>

[https://github.com/soumyajit4419/Face\\_And\\_Emotion\\_Detection](https://github.com/soumyajit4419/Face_And_Emotion_Detection)

<https://www.kaggle.com/datasets/msambare/fer2013/code?datasetId=786787&sortBy=voteCount>

<https://github.com/amineHorseman/facial-expression-recognition-svm>

<https://iopscience.iop.org/article/10.1088/1742-6596/1852/3/032040/meta>