

Facial Emotion Recognition

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ABSTRACT

Facial emotion recognition is one of the promptly developing branches within the machine learning domain. In this paper, we are presenting our application based on Convolutional Neural Networks, which is trained using a comprehensive facial expressions dataset.

CCS CONCEPTS

• **Machine Learning Approaches** → Neural Networks; • **Image Manipulation** → Image processing;

KEYWORDS

Emotion Recognition, Convolutional Neural Networks, Face Expressions

1 INTRODUCTION

Facial expressions are the mirror of our feelings. While it is easy to understand the emotion for human beings, a challenging problem emerges when we intend to teach a machine how to analyze the data and comprehend the emotions of human in real-time applications. Emotion recognition can be applied in various areas such as health-care, drug testing, video games, website customization, education, advertisements etc. Without learning about any person, we can get whether they like something or not and this can be used for recommendation systems. Our main target is based on education system, medicine and marketing.

2 IMPLEMENTATION

Emotions recognition is a technique to extract the emotions on a human face by the help of software which uses advanced image processing. To do this task, as a first step data needs to be collected and processed to give a fast result at a time of a good many human' facial emotions. Our project's main aim is automatically to recognize human emotions and 6 basic human emotions are used in our research: happiness, sadness, neutral, angry, disgust, surprise.

One of the methods to teach emotions to the machine is a convolutional neural network which has been successful in image classification problems. The proposed architecture which consists of 12 layers is inspired by famous VGG 16

model. Following logic of above mentioned model, kernel size is fixed to is 3x3, while the number of filters increases by two convolutional layers from 32 to 128 and each followed by MaxPooling which is good at extracting exponential features sampled from mixture distributions[1]. Then, two fully connected layers follow convolutional layers. To prevent overfitting, 3 Dropout layer with rate 0.5 are added model. Model ends with softmax function which are most often used as the output classifier to present a probability distribution over a binary variable[2]. Model predict distribution of 6 emotions on image which is converted into grayscale and cropped in 128x128x1 dimension around human face.

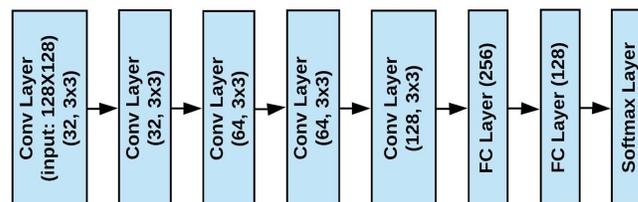


Figure 1: Architecture of proposed CNN model without Pooling and Dropout Layers

3 RESULTS AND DISCUSSION

We trained our model on 2400 images using Cohn-Kanade dataset. Evolution of our model was made based on 600 images from same dataset which weren't used during training. Accuracy for emotion detection that we got is 88.17±3.08%. The most hard detected emotion is sadness, while surprise almost never confused with other emotions. The algorithm detects emotions more easily when there are at least two distinguished features and topmost shape of face plays an import role in detection compare to lower part of face.

REFERENCES

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