**MUSIC PLAYBACK USING EMOTIONS**

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**ABSTRACT**

Human emotion recognition plays an important role in the interpersonal relationship. The automatic recognition of emotions has been an active research topic from early eras. Therefore, there are several advances made in this field. Emotions are reflected from speech, hand and gestures of the body and through facial expressions. Hence extracting and understanding of emotion has a high importance of the interaction between human and machine communication. This paper describes the advances made in this field and the various approaches used for recognition of emotions. The main objective of the paper is to propose real time implementation of emotion recognition system.

**INTRODUCTION**

Ever since computers were developed, scientists and engineers thought of artificially intelligent systems that that are mentally and/or physically equivalent to humans. Various methodologies such as machine learning and deep learning technologies are evolved in the field of self-learning drastically. Artificial intelligence has also evolved alongside it. The use of algorithms such as CNN and ANN with base as neural networks helps in the understanding of self-learning.

**PROBLEM STATEMENT**

Psychologists’ profession is to better understand humans and solve their problems. One of the major drawbacks f their field is predicting emotions. The basis of predicting emotions lies in the mood of the person whether a person is happy or sad we cannot clearly identify. For this we use convolution and neural networks to better understand the facial structure using artificial neurons and datasets. One more drawback of this particular application of emotion recognition is people can easily fake their emotions which is a human error. Another drawback is that the person wearing a masking, we cannot predict their emotions.

**LITERATURE REVIEW**

For the development of a system that is able to recognize emotions through facial expressions, previous research on the way humans reveal emotions as well as the theory of automatic image categorization is reviewed. In the first part of this section, the role of interpreting facial expressions in emotion recognition will be discussed. The latter part surveys previous studies on automatic image classification.

A key feature in human interaction is the universality of facial expressions and body language. Apparently humans, but also animals, develop similar muscular movements belonging to a certain mental state, despite their place of birth, race, education, etc. Hence, if properly modelled, this universality can be a very convenient feature in human machine interaction: a well-trained system can understand emotions, independent of who the subject is. The basis of predicting emotions is by using the depths of the scaling of parameters like chin widths, height, etc., based on these scales; the interpreter predicts the similarity between the received image and the existing datasets. Thus making it able to predict emotions.

One should keep in mind that facial expressions are not necessarily directly translatable into emotions, nor vice versa. Facial expression is additionally a function of e.g. mental state, while emotions are also expressed via body language and voice. More elaborate emotion recognition systems should therefore also include these latter two contributions. However, this is out of the scope of this research and will remain a recommendation for future work. Readers interested in research on emotion classiﬁcation via speech recognition are referred to Nicholson et al.; as a ﬁnal point of attention, emotions should not be confused with mood, since mood is considered to be a long-term mental state. Accordingly, mood recognition often involves longstanding analysis of someone’s behavior and expressions, and will therefore be omitted in this work.

**Software Hardware Requirements**

Neural networks, and deep networks in particular, are known for their need for large amounts of training data. Moreover, the choice of images used for training are responsible for a big part of the performance of the eventual model. This implies the need for a both high qualitative and quantitative dataset. For emotion recognition, several datasets are available for research, varying from a few hundred high resolution photos to tens of thousands smaller images. Hence for the three networks under consideration, training will be done using 9000 samples from the Facial Expression Recognition Challenge (FER-2013) data with another 1000 new samples for validation. Subsequently testing will be done with 1000 images from the RaFD (Radboud Faces Database) set to get an indication of performance on clean high quality data. This latter set has an even distribution over all emotions.

Furthermore, with use of the Haar Feature-Based Cascaded Classiﬁer inside the OpenCV framework, all data is preprocessed. For every image, only the square part containing the face is taken, rescaled, and converted to an array with 48x48 grey-scale values.

The networks are programmed with use of the TFLearn library on top of TensorFlow, running on Python. This environment lowers the complexity of the code, since only the neuron layers have to be created, instead of every neuron. The program also provides real-time feedback on training progress and accuracy, and makes it easy to save and reuse the model after training

The use of Python as a coding platform serves us greatly as, it being high-level programming language and being platform independent. The execution is easy as most of the code uses libraries and modules, which can be imported easily.

To implement the emotion recognition as an application, we use raspberry Pi3 as, it serves as a modular platform for execution of IoT based codes, which can be executed using Xming or PuTTY software. The basic needs in hardware include, a Raspberry Pi3 and a camera, which on physical implementation, a CamPi can be used, fir appropriate placement.

**Modules Used**

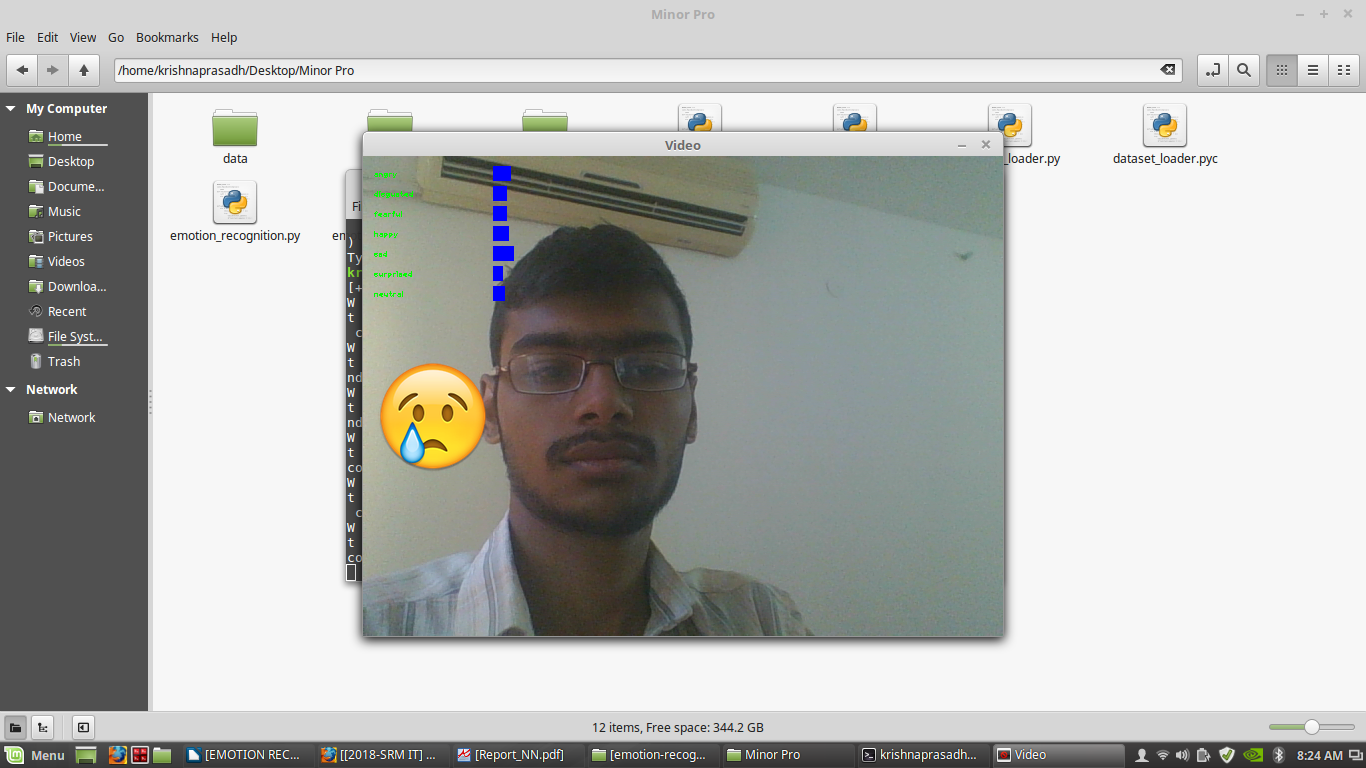
OpenCV (Open Source Computer Vision Library) is an open-source BSD-licensed library that includes several hundreds of computer vision algorithms. The document describes the so-called OpenCV 2.x API, which is essentially a C++ API, as opposite to the C-based OpenCV 1.x API. The latter is described in opencv1x.pdf. OpenCV has a modular structure, which means that the package includes several shared or static libraries.

The h5py package is a Python interface to the HDF5 binary data format. It lets you store huge amounts of numerical data, and easily manipulate that data from NumPy. For example, you can slice into multi-terabyte datasets stored on disk, as if they were real NumPy arrays. Thousands of datasets can be stored in a single file, categorized and tagged however you want.

TensorFlow is an open source software library for numerical computation using data flow graphs. Nodes in the graph represent mathematical operations, while the graph edges represent the multidimensional data arrays (tensors) communicated between them. The flexible architecture allows you to deploy computation to one or more CPUs or GPUs in a desktop, server, or mobile device with a single API. TensorFlow was originally developed by researchers and engineers working on the Google Brain Team within Google's Machine Intelligence research organization for the purposes of conducting machine learning and deep neural networks research, but the system is general enough to be applicable in a wide variety of other domains as well.

TFlearn is a modular and transparent deep learning library built on top of Tensorflow. It was designed to provide a higher-level API to TensorFlow in order to facilitate and speed-up experimentations, while remaining fully transparent and compatible with it. TFLearn introduces a High-Level API that makes

neural network building and training fast and easy. This API is intuitive and fully compatible with Tensorflow.

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NumPy is the fundamental package for scientific computing with Python. It contains among other things; a powerful N-dimensional array object, sophisticated (broadcasting) functions, tools for integrating C/C++ and FORTRAN code, useful linear algebra, Fourier transform, and random number capabilities.

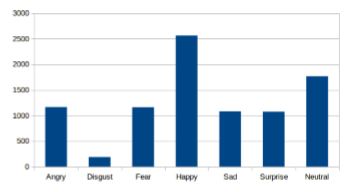
Besides its obvious scientific uses, NumPy can also be used as an efficient multi-dimensional container of generic data. Arbitrary data-types can be defined. This allows NumPy to seamlessly and speedily integrate with a wide variety of databases.

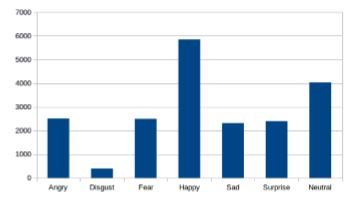
**IMPLEMENTATION STATUS**

The basis of our project has been implemented, i.e recognizing the emotions. We have successfully executed and tested the negative emotions such as sad, fearful, neutral and surprised.

We have yet to implement the positive emotions and integrate it to an IoT based application. We plan to control music based on the emotions. An example is , if a person is sad , we can cheer him up by playing some happy music. Since music has been proved as the best healer, by medical science.

**SCREENSHOT OF RESULT**

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**CONCLUSION**

Music Playback using emotions, acts as one of the best healers for human life. A person in a regretful mood might do something awful to himself, when there’s no one there to support him at the grave time of need. To prevent this music is being controlled by emotions, which is a very innovative methodology.

Emotions predicted cannot be falsified that easily, but if a person intentionally implicates his/her emotions, then as the saying goes, “We are only Human”

**ACKNOWLEDGEMENT**

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**FUTURE ENCHANCEMENTS**

The Future enhancements of emotion recognition using neural networks, include in betterment of human life. This could prevent N number of suicidal attempts, by sending a notification to the respected authorities, in preventing such mishaps.

Also, it could help in monitoring the states of employees, in enhancing their business. It can also be used by online marketing websites like flipkart or Amazon, to concentrate Ads and products based offers, based on the emotional state of the customer purchasing.

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