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**Facial Expression Detection Using Machine Learning**

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**Abstract:**

Facialexpression communicate non verbal cues, which plays an important role in interpersonal relations. Solid expression recognition by machine or Automated Facial Expression Recognition(FER) is still a challenge today[2]. Existing approaches for FER traditionally lack generalizability when applied to unseen images and most of the existing approaches are based on engineered features where the classifier’s hyperparameters are tuned to give best recognition accuracies across a single database,or a small collection of similar database. Nevertheless,results are not satisfactory when applied to novel data[2].Facial expression can be considered to comprise of disfigurements of facial parts and their spatial relations,or change’s in the face’s pigmentation[1]. research had been done based on this problems and researchers get results by using CVIPtools[1].There are also research done based on image features,there are mainly two processes in the system,face detection which uses Haar like features and FER which extracts Histogram of oriented gradients(HOG) features from each facial region[3].Many other research had also done by constructing video processing system to indentify emotions by analyzing the position of facial landmark [4].There is also a novel technique called FERC based on two part CNN to find facial expression[5].

**Introduction:**

Facial expression is the most effective form of non verbal communication and it provides intimation about emotional state,mindset and information.Facial expression is the faster way to connect with someone.The requirement for proficient communication channels between machine and humans become progressively imperative in light of the fact that machines and individuals start to share a variety of tasks.System of these communication channels are known as Human Machine Interaction(HMI) systems[1].but current HMI systems have not yet reached the full satisfactory level for giving accuracy.In designing HMI and HRI(Human Robot Interaction)systems facial expression is very important.numerous computer vision and machine learning algorithms have been proposed for automated Facial Expression Recognition(FER)[2].FER is studied extensively due to its imperative applications in Human computer interaction,medical treatement and virtual reality[3][6].In general emotion state is defined as 7 emotional states,such as neutral,happy,sad,angry,fearful,surprised and disgusted[3].The challenge of automated FER comes from the significant variation in people’s looks and how they manifest their emotions, not to mention all the environmental characteristics(pose,lighting)that can intervene in facial observation.A repeatedly occurring problem in the field is the lack of largw,publicly available datasets for FER[4].There are three significant steps in most FER algorithms,1.Face detection,2.Feature extraction,3.Expression classification, these steps must be carefully considered and developed for a successful model .The input image is a picture of whole scene and algorithm ,must employ a strategy to parse where the face is in the image[7].

**Motivation of study:**

It fascinates me how a computer can recognizes a human expression and accordingly gives the result and so I choose this subject for my research.

1.bias in dataset: the datasets that have been used till now were not proper in most of the cases, the training data should be proper and otherwise the model tends to react in certain way or biased way. And so this is my motivation to improve the dataset and algorithm that it can perform well and accurate .

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