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A Facial EmotionExpression Detection Using CNN

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ABSTRACT:
Humans interact with each other mainly through speech, but also through body gestures, to emphasize certain parts of their speech and to display emotions. Pain is an unpleasant feeling that has been shown to be an important factor for the recovery of patients. Since this is costly in human resources and difficult to do objectively, there is the need for automatic systems to measure it.In this project, we have developed convolutional neural networks (CNN) for a facial expression recognition task.The proposed method has three stages: (a) face detection, (b) feature extraction using Active ApperarenceModel (AAM) like angle and magnitude of pixels and (c) facial expression recognition.This experiments show that the proposed model performs significantly better on the target tasks compared to the state-of-the-art approaches.

I.INTRODUCTION

Most of the models for facial expressions recognition function only for six universal facial expressions. There exist very few computational models that can recognize very subtle facial expressions i.e. pain and fatigue Pain monitoring of patients (in a clinical scenario) is a very complicated, subjective but as well as very important task. Usually pain is self reported has many limitations. Thus, it is desirable to design such a system that can automate this task. Generally, manual monitoring of pain has following problems: first, pain cannot be recorded continuously. Second, the problem of subjectivity i.e. different patients have different perception of pain and can under report or over report the pain. Lastly, the person recording the pain has to make judgment of pain level, which could vary from person to person. An automatic computer vision system can solve all of the above mentioned problems.

THE AUTOMATIC detection of pain is a subject of high interest in the health domain since it is not only an important indicator for medical diagnosis but has also been shown to be an obstacle for patient recuperation in intensivecare units and after surgery . It is shown how good pain assessment is crucial for a good pain control, which is usually verbally checked by professional nurses, known as self-report. However, this is not always possible due to the age of the patient, the particular illness, or language impairments. Moreover, pain is a subjective feeling which can be described differently across cultures . Thus, pain assessment could be highly benefited from automatic tools.An approach that automatically estimates self-reported pain scores rather than objective pain metrics may be more useful for individuals experiencing pain. Because individuals make different facial expressions depending on personal factors, a method for automatic pain estimation would likely improve by not only accounting for how facial expressions and specific facial actions vary, but also personalizing on an individual's qualitative characteristics by explicitly representing them as features. These features could then be incorporated into a model. This feature-level personalization differs from the model-level personalization (i.e., varying the model architecture) as a single model is consistently applied to all subjects. Using these personalized features may enable the model to learn additional personalinformation and increase its estimative power.

II.RELATED STUDY

Image processing is a method to convert an image into digital form and perform some operations on it,

in order to get an enhanced image or to extract some useful information from it. It is a type of signal dispensation in which input is image, like video frame or photograph and output may be image or characteristics associated with that image. Usually Image Processing system includes treating images as two dimensional signals while applying already set signal processing methods to them. It is among rapidly growing technologies today, with its applications in various aspects of a business. Image Processing forms core research area within engineering and computer science disciplines too. Image processing basically includes the following three steps.

- Importing the image with optical scanner or by digital photography.
- Analyzing and manipulating the image which includes data compression and image enhancement and spotting patterns that are not to human eyes like satellite photographs.
- Output is the last stage in which result can be altered image or report that is based on image analysis.

The purpose of image processing is divided into 5 groups. They are Visualization, Image sharpening and restoration, Image retrieval, Measurement of pattern, Image Recognition.

1. Visualization - Observe the objects that are not visible.
2. Image sharpening and restoration - To create a better image.
3. Image retrieval - Seek for the image of interest.
4. Measurement of pattern – Measures various objects in an image.
5. Image Recognition – Distinguish the objects in an image.

Statistical functions analyze the general characteristics of an image by:

- Computing the mean or standard deviation
- Determining the intensity values along a line segment
- Displaying an image histogram
- Plotting a profile of intensity values

Image segmentation is the process of partitioning a digital image into multiple segments. The goal of segmentation is to simplify and/or change the representation of an image into something that is more meaningful and easier to analyze. Image segmentation is typically used to locate objects and boundaries (lines, curves, etc.) in images. More precisely, image segmentation is the process of assigning a label to every pixel in an image such that pixels with the same label share certain characteristics.

Edge detection is a type of image segmentation technique which determines the presence of an edge or line in an image and outlines them in an appropriate way. The main purpose of edge detection is to simplify the image data in order to minimize the amount of data to be processed.

III.SYSTEM METHODOLOGIES

A.EXISTING SYSTEM

Geometric feature learning is a technique combining machine learning and computer vision to solve visual tasks. The main goal of this method is to find a set of representative features of geometric form to represent an object by collecting geometric features from images and learning them using efficient machine learning methods. Humans solve visual tasks and can give fast response to the environment by extracting perceptual information from what they see. Researchers simulate humans' ability of recognizing objects to solve computer vision problems. For example, M. Mata et al. applied feature learning techniques to the mobile robot navigation tasks in order to avoid obstacles. They used genetic algorithms for learning features and recognizing objects (figures). Geometric feature learning methods cannot only solve recognition problems but also predict subsequent actions by analyzing a set of sequential input sensory images, usually some extracting features of images. Through learning, some hypothesis of the next action are given and according the probability of each hypothesis give a most

probable action. This technique is widely used in the areaof artificial intelligence.

B.PROPOSED SYSTEM

The proposed method has three stages: (a) face detection, (b) feature extraction and (c) facial depression recognition. In this method, the Euclidean distance between the feature points of the training images and that of the query image iscompared. Based on minimum Euclidean distance, output image expression is decided.

FEA TURE EXTRACTION HOG METHOD

HOG a method of intensive descriptors that is used for local overlapped images, constitutes features by calculating thelocal direction of gradient. At present, the approach combining HOG with Support Vector Machine (SVM) has been widely applied to image recognition and achieved a great success especially in human detection. The advantage ofHOG feature is that it is based on histogram of oriented gradient. It can not only describe the feature of face contours, but also be not sensitive to light and small offset. Obtain the human facial features by combining the features of all blocks in line

IV.DESCRIPTION OF MODULES

DIP:

Image Processing Toolbox provides a comprehensive set of reference-standard algorithms and graphical tools for image processing, analysis, visualization, and algorithm development. You can perform image enhancement, image de- blurring, feature detection, noise reduction, image segmentation, spatial transformations, and image registration. Many functions in the toolbox are multithreaded to take advantage of multi-core and multiprocessor computers. Image Processing Toolbox supports a diverse set of image types, including high dynamic range, giga-pixel resolution, ICC- compliant color, and tomographic images. Graphical tools let you explore an image, examine a region of pixels, adjust the contrast, create contours or histograms, and manipulate regions of interest (ROIs). With the toolbox algorithms you can restore degraded images, detect and measure features, analyze shapes and textures, and adjust the color balance of images.

Analyzing Images

Image Processing Toolbox provides a comprehensive suite of reference-standard algorithms and graphical tools forimage analysis tasks such as statistical analysis, feature extraction, and property measurement.

Statistical functions let you analyze the general characteristics of an image by:

- Computing the mean or standard deviation
- Determining the intensity values along a line segment
- Displaying an image histogram
- Plotting a profile of intensity values

Edge-detection algorithms let you identify object boundaries in an image. These algorithms include the Sobel, Prewitt, Roberts, Canny, and Laplacian of Gaussian methods. The powerful canny method can detect true weak edges without being "fooled" by noise.

V.PROCESSING OF OPERATIONS

Preprocessing techniques are needed on colour, grey-level or binary document images containing text and/or graphics. In character recognition systems most of the applications use grey or binary images since processing colour images is computationally high. Such images may also contain non-uniform background and/or watermarks making it difficult to extract the document text from the image without performing some kind of preprocessing, therefore; the desired result from preprocessing is a binary image containing text only. Thus, to achieve this, several steps are needed, first, some image enhancement techniques to remove noise or correct the contrast in the image, second, thresholding to remove the

background containing any scenes, watermarks and/or noise, third, page segmentation to separate graphics from text, fourth, character segmentation to separate characters from each other and, finally, morphological processing to enhance the characters in cases where thresholding and/or other preprocessing techniques eroded parts of the characters or added pixels to them. The above techniques present few of those which may be used in character recognition systems and in some applications; few or some of these techniques or others may be used at different stages of the OCR system

VI.RESULTS

Implementation results

Fig input image Matlab 2014a has been used above fig shows input image of given algorithm

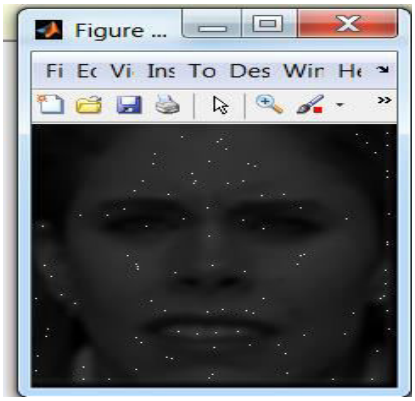

Fig key points Above figure shows key point and feature identification of input image

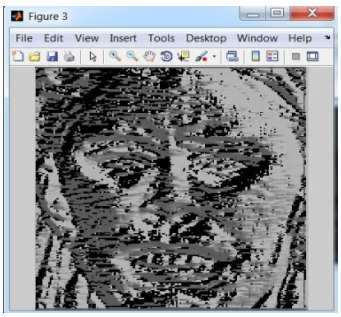

Fig angle of pixel

VII.CONCLUSION

Facial depression Recognition System has a wide range of applications in psychological research and human-computer interaction applications.The system plays a communicative role in interpersonal relations because they can reveal the affective state,cogmtlve activity, personality, intention and psychological state of a person. The proposed system consists of three modules.The face detection module is based on image segmentation technique where the given image is converted into a binary image and further used for face detection.In this project a comprehensive study of how the HOG descriptor could be effectively

exploited for facial expression recognition purposes has been carried out. In order to perform the above mentioned investigation, a pipeline, commonly used in FER analysis and equipped with an HOG descriptor, has been used as baseline. For expression recognition, Euclidean distance method is useful for static images and requires a large amount of manual work. In this system, the static images as well as video can be given as input and tested for the different expressions. Also the system can work accurately for person-independent database. The accuracy of facial expression recognition varies with number of training samples.

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