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| **Facial emotional, Age, Gender, Face detection using Wide residual Architecture**  **VADDI JASWANTH REDDY1, TIRUPATI KIRAN RAJ2, KANALA ARAVIND3, MR.D ELANGOVAN4**  ([elangovan.sdurai@gmail.com](mailto:elangovan.sdurai@gmail.com), Assistant Professor, Department of CSE, Panimalar Engineering College, Chennai – 6000 123)  B.E, Computer Science and Engineering , Panimalar Engineering College Anna University , Chennai, Tamil Nadu, India – 600 123 |
| **ABSTRACT** |
| Automatic emotion recognition based on facial expression is an interesting research field, which has been presented and applied in several areas such as safety, health, and human-machine interfaces. Various techniques to interpret, code facial expressions and extract these features are being developed in order to have a better prediction, with high accuracy and precision by the computer. With the remarkable success of deep learning, the different types of architectures of this technique are exploited to achieve better performance. Quick and accurate emotion recognition may increase the possibilities of computers, robots, and integrated environments to recognize human emotions, and respond accordingly to the social rules. The state-of-the-art techniques are only capable of detecting age, gender, and face behavior. New techniques are required for the accurate estimation of human facial emotions. I cover deep learning-based Wide Resonant Architecture to analyze granular level emotional changes.  **Keywords:** Deep learning, Age, emotion, facial recognition |
| **1. INTRODUCTION** |
| Deep Learning has found huge applications in the fields of Computer vision. Some of the most important applications of computer vision are in the fields that deal with facial data. Face Detection and recognition are being widely used in security-based applications.  The human face may be a storehouse of various information about personal characteristics including identity, emotional expression, gender, age. The looks of the face are affected considerably by aging. This plays a significant role in non-verbal communication between humans. Age and gender are two key facial attribute that play a really foundational role in social interactions making age and gender estimation from one face image a very important task in machine learning applications like access control, human-computer interaction, law enforcement and marketing intelligence and visual surveillance.  Automatic gender classification and age detection may be a fundamental task in computer vision which has recently attracted immense attention. It plays a very important role in an exceedingly wide selection of real-world applications like targeted advertisement, forensic science, visual surveillance, content-based searching and human-computer interaction systems. For instance, wide residual architecture is used to display advertisement-supported different gender and different age brackets. This method may be employed in different mobile applications where there is some age restricted content in order that only appropriate users can see this content. However, gender classification and age approximation is a still difficult task. A model is proposed which can initially perform feature extraction on the input image which can classify eyes, lips, beard and hair.  Supporting these features the model will classify the gender as male or female. Haar Cascade is used for feature extraction purposes. The Age is estimated with the assistance of the Caffe Model. The age classifier takes an image of an individual’s face of size 256×256 as an input to the algorithm that is then cropped to 227×227. The age classifier returns an integer representing the age range of the individual. There are 8 possible age ranges and the age classifier returns an integer between 0 and seven. The gender classifier returns a binary result where 1 indicates male and 0 represents female. |
| **2. PROPOSED SYSTEM** |
| An automated, low-cost, and real-time system is proposed for age, gender, and  facial emotional estimation from face images. To achieve this, face detection and pose estimation methods are adopted to acquire frontal face images. The proposed architecture tracks and responds to human behavior in real-time. It integrates eye-tracking for deeper insights into the effect of various stimuli on emotions. The Face recognition analysis detects faces in images or video and then uses face tracking and provides unity of action to accurately deliver the gender, emotion and age of faces in a roughly frontal position. The use of generic CNN is absent in the proposed system. A specialized system called Wide Resonant Architecture is used to analyze granular level emotional changes. The proposed system ensures that human emotional behavior is detected with high-level accuracy. In emotion detection three steps are used namely face detection, features extraction and emotion classification using deep learning with our proposed model which gives better results than the previously used models.  The proposed system consists of Four modules –   * + 1. Face Detection     2. Gender Detection     3. Age Detection     4. Emotion estimation   In the proposed method, computation time is reduced, validation accuracy is increased and loss also decreased, and further performance evaluation is achieved which compares our model with the previous model. The proposed model emphasizes that emotion detection using deep convolutional neural networks can improve the performance of a network with more information. The main contributions and advantages of the proposed system can be summarized as follows: FER is usually carried out in three stages involving face detection, feature extraction, and expression classification. The Lightweight model & fast processing - low data size and memory usage ensure fast yet accurate gender, age, and emotion estimation in milliseconds. Platform & device independent - Face analysis works flawlessly on any mobile or web application Secured - No personal data such as photos or names is stored or processed by default, ensuring privacy. Interpretability - The model is easy to integrate into any environment. High accuracy - To use this facial pose estimation system, it is noticed that wide residual architecture gives a high accuracy rate, very precise measurements, permits high deployment and authentication. |
| **3. METHODOLOGY** |
| The process of searching for faces is called face detection. In real-time, searching for face in the sequential images containing face and background is seen as the first step of the systems, and the corresponding tasks of face analysis are implemented. Face detection is to search for faces with different expressions, sizes and angles in images in possession of complicated light and background, and then feedback parameters of the face.  Facial emotion recognition refers to the separation of specific facial states from a given static image or dynamic video sequence, to determine the psychological emotions of the object to be recognized. Facial emotions can be divided into seven categories: happy, sad, fearful, angry, surprised, disgusted, and neutral. The first thing to do for facial expression recognition is to preprocess the collected images, and then carry out feature extraction and classification recognition. The third component, Emotion estimation, detects facial expressions from images or videos and returns the probability distribution of each of the universal emotions: happiness, sadness, anger, fear, surprise, disgust, and additionally neutral. Automatic facial expression analysis of one or multiple faces in real- time can also be performed. |
| **4. MODELING AND ANALYSIS**  A general flow of execution for the proposed system is presented in this section.  This diagram is nothing but a simple description of all the entities that have been incorporated into the system. The diagram represents the relations between each of them and involves a sequence of decision-making processes and steps. You can simply call it a visual or the whole process and its implementation. All functional correspondences are explained in this diagram.  https://lh4.googleusercontent.com/lXDW3Rw-ep2c6T2Xghl7gtxTaX7Uzsj4H05zUupuyeBsPpI7_d8R3YoPG7KKtUqew8h03eiIe0JHRnX5s9Awq3d4wbxtpNMl0uE46g60TJKmUtZ9sjFls8q26BXR-Of6GJHuPvOYtF0GgVRVIg |
| **5. ANALYSIS** |
| This project provides an example of how computer vision recognizes human face effectively. Since the older techniques uses CNN networks , here wide residual architecture is used. Face detection is to search for faces with different expressions, sizes and angles in images in possession of complicated light and background, and then feedback parameters of the face The gender estimation process consists of three steps: Detection and extraction of the facial region from the input image/video. selection of the frontal face images from the, extracted facial regions using head pose estimation, and gender estimation using statistical facial features. This module features features such as the location of the pupils, eye corners, lip boundaries, etc. This is because these features are bound to change with age. This algorithm is trained on a large data set of different faces to detect the approximate age of a person based on such features Facial emotions can be divided into seven categories: happy, sad, fearful, angry, surprised, disgusted, and neutral |
| **6. RESULTS AND DISCUSSION** |
| An automated, low-cost, and real-time system is proposed for age, gender, and  facial emotional estimation from face images. To achieve this, face detection and pose estimation methods are adopted to acquire frontal face images. The proposed architecture tracks and responds to human behavior in real-time. It integrates eye-tracking for deeper insights into the effect of various s stimuli on emotions. The Face recognition analysis detects faces in images or video and then uses face tracking and provides unity of action to accurately deliver the gender, emotion and age of faces in a roughly frontal position. The use of generic CNN is absent in the proposed system. A specialized system called Wide Resonant Architecture is used to analyze granular level emotional changes. The proposed system ensures that human emotional behavior is detected with high-level accuracy. In emotion detection three steps are used namely face detection, features extraction and emotion classification using deep learning with our proposed model which gives better results than the previously used models.   * FER is usually carried out in three stages involving face detection, feature extraction, and expression classification​ * Lightweight model & fast processing - Low data size and memory usage ensure fast yet accurate gender, age, and emotion estimation in milliseconds​ * Platform & device independent - Face analysis works flawlessly on any mobile or web application​ * Secured - No personal data such as photos or names is stored or processed by default, ensuring privacy.​ * Interpretability - The model is easy to integrate into any environment |

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| **7. CONCLUSION** |
| Our proposed model for face recognition and pose estimation systems is beneficial to the world for advanced applications such as access and security, payments, and criminal identifications. The proposed framework is not only much faster than the previous work but also maintains competitive accuracy with state-of-the-art facial emotion detection systems. |
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