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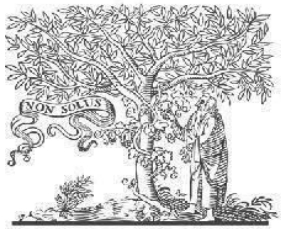

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FACE TO BMI A DEEP LEARNING BASED APPROACH FOR COMPUTING BMI FROM FACE

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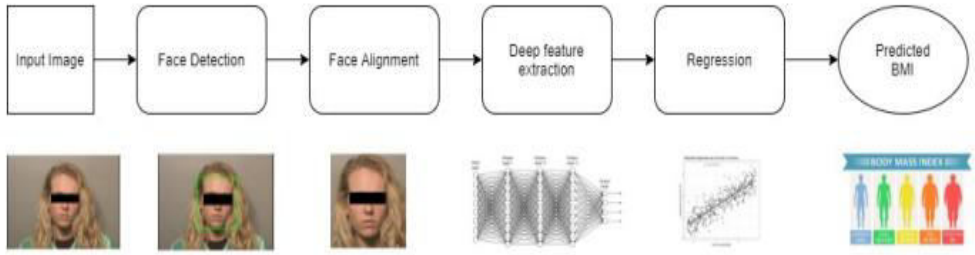
ABSTRACT

Body Mass Index (BMI) is a measure of how healthy a person is with respect to their body weight. BMI has shown a correlation with various factors like physical health, mental health, popularity. BMI calculation often requires accurate height and weight, which would take manual work to measure. Largescale automation of BMI calculation can be utilized for analyzing various aspects of society and can be used by governments and companies to make effective decisions. Previous works have used only geometric facial features discarding other information, or a data-driven deep learning-based approach in which the amount of data becomes a bottleneck. In this project we are using python CNN (convolution neural networks) algorithm to predict BMI by analysing facial features. CNN will take image as input and then extract facial features from image and based on facial features BMI will be predicted.

I.INTRODUCTION

The BMI(Body Mass Index) of any person is a crucial indicator of health. It checks if the person is underweight, normal, overweight, or obese. In the current scenario, health is one of the most neglected factor. Technology which has more benefits also has some drawbacks. It has made humans lazy and thus reduced their physical activity leading to a sedentary lifestyle and a rise in BMI which adversely affects their health and increases the risk of chronic diseases. The more the BMI, the more is the chance of developing cardiovascular and other harmful diseases. On the other side of the coin, some people have problems like malnutrition and deficiencies. So, BMI can help a person to keep a track record of their health. According to [1], on average, one out of every three adults is obese, which is about 36% of the population, and by the year 2030, an estimated 20% of the global population would be obese. Human faces carry a significant amount of information about a person. Recent studies have shown a strong correlation between the human face and the BMI of the person. The people with skinny faces have chances of less BMI and vice versa. Generally, obese people tend to have the middle and lower part of the face wider. It is difficult for the person to calculate BMI if they do not have a

measuring tape and weighing machine. Recently there have been many advancements in deep learning where models can extract meaningful features from the images. By utilizing these methods, we can predict the BMI from human faces. So, In this paper, we have proposed a technique to predict BMI from human faces. This system could help health insurance companies to maintain the health records of their customers. Also, the government could track the health records of a particular region and devise policies accordingly



System architecture

II.EXISTING SYSTEM

A person's body mass index (BMI) is a gauge of how healthy they are in relation to their weight. Numerous aspects, including physical health, mental health, and popularity, have been linked to BMI. BMI calculations frequently call for precise measurements of height and weight, which entail labor-intensive manual labour. Governments and businesses can employ large-scale automation of BMI calculation to analyse different facets of society and to make smart decisions. Previous approaches have exclusively employed geometric facial traits, disregarding

additional information, or have used a data-driven deep learning approach where the volume of data becomes a difficult.

disadvantages of existing system:

1. the volume of data becomes a difficult

2. Recently there have been many advancements in deep learning where models can extract meaningful features from the images but can't predict BMI

III.PROPOSED SYSTEM

In this project, we're analysing facial features to estimate BMI using the Python CNN (convolution neural networks) algorithm. CNN will use a picture as its input, extracting facial traits from it before predicting BMI based on those features.

Advantages of proposed system:

1.Far preprocessing for best prediction

2. High prediction rate

IV.METHODOLOGY

1. Data Collection and Preparation : The first step in the methodology involves gathering a dataset comprising facial images and corresponding Body Mass Index (BMI) measurements. The facial images can be sourced from publicly

available datasets such as the UTKFace dataset or the CelebA dataset, which include images with demographic annotations. For the BMI measurements, either existing clinical datasets or datasets collected through surveys where participants' heights and weights are recorded will be used. Each image in the dataset is paired with the BMI value of the individual, ensuring that the data is accurately labeled. The dataset is then split into training, validation, and test subsets to facilitate robust model training and evaluation. Data augmentation techniques, such as cropping, rotation, and scaling, are applied to increase the diversity of the facial images and improve the model's ability to generalize.

2. Preprocessing : Facial images undergo several preprocessing steps to ensure that they are suitable for deep learning analysis. This includes resizing images to a standard dimension, normalizing pixel values to a range between 0 and 1, and performing face alignment to correct variations in pose and expression. Facial landmarks, such as eyes, nose, and mouth positions, are detected and used to crop and align faces consistently. Additionally, techniques such as histogram equalization may be applied to enhance image contrast and improve feature extraction.

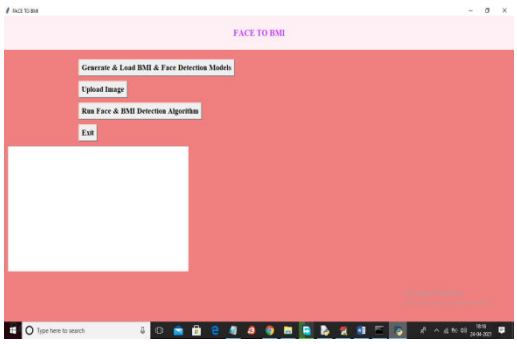
3. Deep Learning Model Design: The core of the methodology involves designing and implementing a deep learning model for BMI estimation from facial images. A Convolutional Neural Network (CNN) architecture is employed due to its effectiveness in image feature extraction and pattern recognition. The CNN model consists of several convolutional layers to capture hierarchical features from the images, followed by pooling layers to reduce dimensionality and retain important features. After the convolutional layers, fully connected layers are used to map the extracted features to a continuous output representing the BMI value. The network is trained using a regression loss function, such as Mean Squared Error (MSE), to minimize the difference between predicted and actual BMI values.

4. Model Training and Evaluation: The training process involves feeding the CNN model with the training dataset, optimizing its parameters using an optimizer like Adam or SGD, and minimizing the regression loss function. During training, the model's performance is monitored using the validation set to evaluate metrics such as Mean Absolute Error (MAE) and R-squared value. Regularization techniques such as dropout and weight decay are employed to prevent overfitting and enhance model generalization. Once training is complete, the model is tested on the unseen test set to assess its accuracy and performance in predicting BMI from facial images. Comparative analysis is conducted against baseline models and existing approaches to highlight improvements.

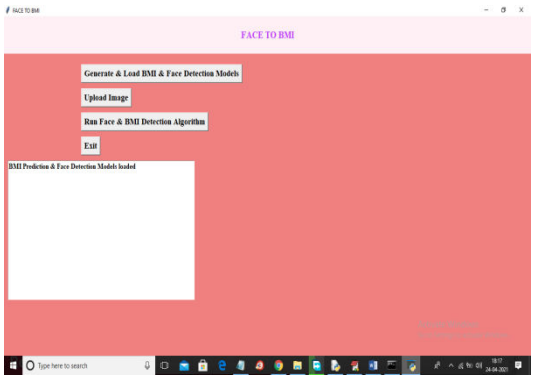
5. Analysis and Interpretation: Following the evaluation, a detailed analysis of the model's performance is carried out. This includes qualitative assessments such as visual inspection of predicted BMI values versus actual

values to identify any patterns or anomalies. Quantitative metrics, including error distributions and performance statistics, are analyzed to understand the model's strengths and limitations. Additionally, sensitivity analysis is performed to determine the impact of different hyperparameters and network configurations on the model's accuracy. The findings are discussed in the context of existing literature and potential applications, such as non-invasive health monitoring and personalized fitness recommendations.

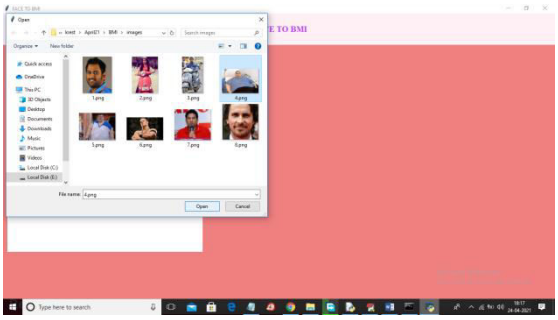
To run project double click on 'run.bat' file to get below screen



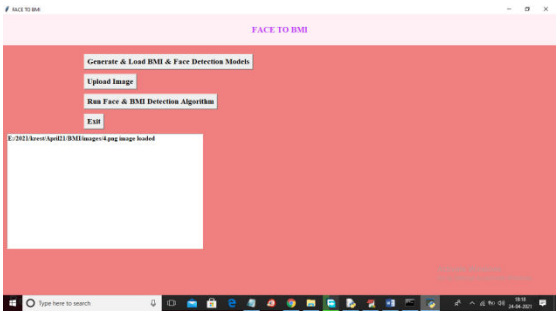
In above screen click on 'Generate & Load BMI & Face Detection Models' button to load face detection library and CNN model to detect BMI.



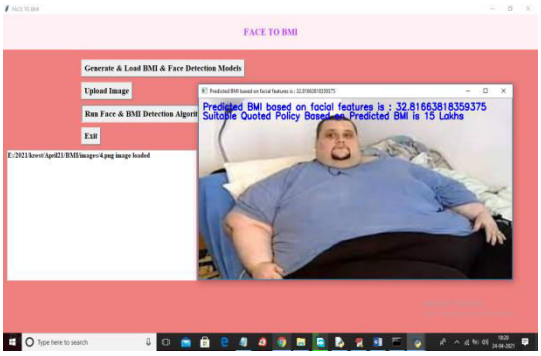
In above screen both libraries are loaded and now click on 'Upload Image' button to upload image



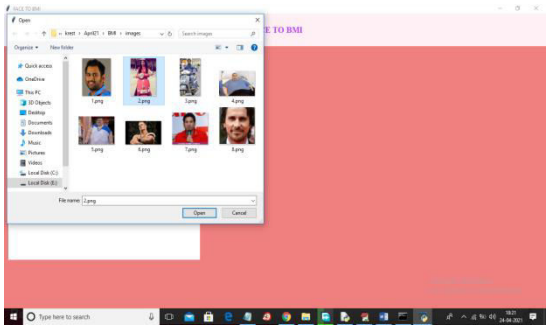
In above screen selecting and uploading '4.png' file and then click on 'Open' button to load image and will get below screen



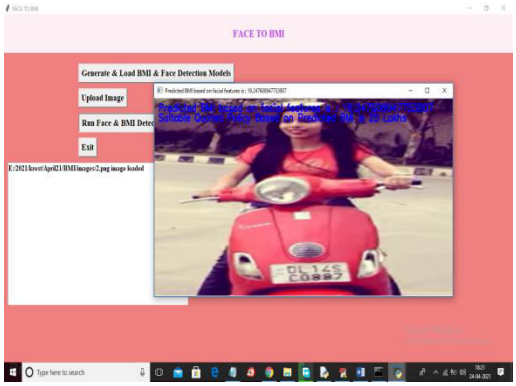
In above screen image is loaded and now click on 'Run face & BMI Detection Algorithm' button to get below result



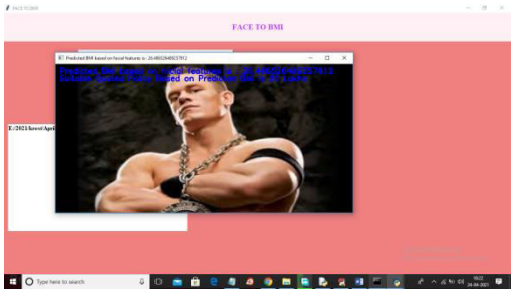
In above screen for given image detected BMI is 32.81 and suggested insurance policy is for 15 lakhs and now try other image



In above screen selecting and uploading 2.png file and then click on 'Open' button and then click on 'Run Face & BMI Detection Algorithm' button to get below screen



In above screen for uploaded image predicted BMI from face is 19.24 and suggested policy amount is 25 lakhs and similarly you can upload other images and test



IV.CONCLUSION

We observed that people with more BMI have a higher risk of developing health issues. We found that there exists a strong association between BMI and the face of a human. So, we proposed an approach to predict BMI from facial images using deep learning. We preprocessed the facial data by aligning the faces to the center using the BMI detection algorithm.

In future work, we will apply our method to social media profile pictures to model population-level obesity rates. Preliminary results show that both regional and demo graphic differences in BMI are reflected in large amounts of Instagram profile pictures.

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