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Face Detection System Using Jetson Nano

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ABSTRACT: Face recognition is implemented using OpenCV deep learning implemented via ResNet architecture, producing more accurate results than previous improved numerical values. Face recognition uses a deep learning approach to metrics using OpenCV supported by the ResNet34 architecture. Facial emotion recognition is achieved by sending parts of the eyes and mouth to the brain, and transmitting the analyzed information as a new synthetic image and developing it. A system that classifies images into one of seven basic facial emotions. Jetson Nano simplifies intensive algorithmic computations by facilitating high frame rate video processing.

KEYWORDS: Human Computer interaction, Jetson Nano, Face detection Cloud computing, Haar cascade.Open cv.

I. INTRODUCTION

Computer vision has become a popular research area as the amount of data grows exponentially, driven by a steady doubling of computing power every year. Since researchers are very interested in understanding how our brains work, computer vision has become a subject of neuroscience and psychological research, not limited to the research field of computer science. Face detection and recognition, along with facial expression analysis and the name detection of the detected face , is currently an active area of research in the computer vision community.

II. PROBLEM STATEMENT

The main problem with face recognition is the high-dimensional space, which must be reduced by any dimensionality reduction method. A description of the face recognition task for real-time applications follows. Real-time face recognition. Speed up. Recognize in high resolution of the fps camera.

III. LITERATURE REVIEW

REFERENCE PAPER	AUTHOR	YEAR	TECHNOLOGY USED	RESULTS
Face Detection and Recognition, Face Emotion Recognition Through NVIDIA Jetson Nano	Vishwani Sati, S. M. Sánchez, J. Corchado	10 September 2020	• Face recognition OpenCV • •	This paper focuses on implementing face detection, face recognition and face emotion recognition through NVIDIA's state-of-the-art Jetson Nano.
Real Time Face Recognition of Human	Suma S L, Sarika Raga	Published 2018	• NVIDIA Jetson Nano	Real time human Face recognition executes in two

Faces by using LBPH and Viola Jones Algorithm Real Time Face Recognition of Human Faces by using LBPH and Viola Jones Algorithm				levels, such as Face detection and Face recognition. For face detection we are using viola-jones algorithm because of its high precision and high real time permit rate which is deployed in opencv by python language. In Face recognition two categories are considered: training phase and evaluation phase.
Face Recognition Using Haar-Cascade Classifier for Criminal Identification	S. Selvi, D. Sivakumar	Published 2019	Haar-Cascade algorithm	This paper implements "Haar-Cascade algorithm" to identify human faces which is organized in OpenCV by Python language and"Local binary pattern algorithm" to recognize faces.

IV. OBJECTIVE

Whenever a new system is introduced, it is designed to compensate for the shortcomings of the old system. The computer mechanism has many advantages over manual systems. The proposed system is a hardware and software project that maintains a central repository of all relevant information. The system allows you to easily access the software and decide what you need.

V. EXISTING SYSTEM

Although face detection systems have some drawbacks, they have great potential in India. This system can be effectively used at ATMs, duplicate voter IDs, passport and visa verification, driver's license verification, protection, and competitions. Other public and private sector exams.

VI. PROPOSED SYSTEM

A Planned Work Approach: Work in an organization is well planned and organized. Data, i.e. images, is properly stored in database storage to help find information as well as stored in storage.
Accuracy: The proposed system has a higher level of accuracy. Everything is done correctly and this ensures that all information provided by the center is correct.
Reliability: For the above reasons, the reliability of the proposed system will be high. The reason the system is more reliable is that the information is now stored correctly.
No Duplicate: In the proposed system, special care must be taken to avoid repetition of information in storage or elsewhere. This enables economical use of storage space and maintains the consistency of stored data.

Immediate retrieval of information: The main purpose of the proposed system is to provide a fast and efficient retrieval of necessary information. Any type of search is available upon user request.

Immediate storage of information: In manual systems, there are many problems with storing the most information for processing.

Ease of use: The system must be easy to operate and can be developed in a short period of time within the user's limited budget.

VII. ALGORITHM

The Algorithm Used for Face Detection

Object detection using Haar feature-based cascading classifiers is an efficient object detection method proposed by Paul Viola and Michael Jones in their 2001 paper "Fast Object Detection Using Boost Cascades of Simple Features". This is a machine learning-based approach in which a waterfall function is trained on a set of positive and negative patterns. It is then used to detect objects in other images.

Haar Cascade:

In this article, we will see how to detect faces using a cascading classifier in OpenCV Python. Facial recognition is very important in various areas of modern society. This is an important step in many applications, including facial recognition (also used as biometrics), photography (for face autofocus), facial analysis (age, gender, emotion recognition), and video surveillance. Recognition of one of the popular algorithms for faces - abusive language. It is a low computational cost, fast algorithm, and provides high accuracy.

Haar Select Elements: Elements like Haar are made up of shadows and highlights. It takes the difference of the sum of the intensities of the shadows and the sum of the intensities of the highlights and gives a single value. This is done to extract the useful elements needed to identify the object

Create Integral Image: A given pixel in the integral image is the sum of all pixels to the left and all pixels above it. Since the Haar type of feature extraction process involves calculating the difference between dark and light rectangular regions, the introduction of integral images greatly reduces the time required to complete this mission.

AdaBoost training: This algorithm selects the best feature from all features.The resulting "strong classifier" is essentially a linear combination of all "weak classifiers".

Cascading classifiers: This is a way of cascading increasingly complex classifiers such as AdaBoost, allowing them to quickly discard negative (non-facial) inputs and do more computations on promising or positive face-like regions. This greatly reduces the computation time and makes the process more efficient.
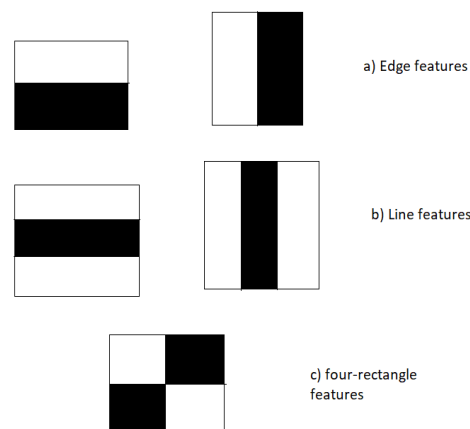

a) Edge features

b) Line features

c) four-rectangle features

Fig 1.Haar cascade Algorithm

VIII. CONCLUSION

Useful for creating numerous industrial and commercial applications, face detection and recognition is a challenging task for many researchers. You can make small improvements to the methodology to make it more efficient and improve your results. : As technology advances, advanced features may be added to the system that may help improve accuracy. In addition, with the help of ANN, facial recognition of emotions is performed. The same architecture can be

used to develop real-time facial emotion recognition, improving reliability and functionality.

IX. FUTURE SCOPE

In the future we will look for the detection of face and to display the name of the detected /trained face.
And finally we would look forward to upload the same service on the cloud to use it anytime ,anywhere and it will be platform free.

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