



Smart Attendance Management System Using Facial Recognition

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Abstract: In the current century, everything around us has become dependent upon technology to make our lives much easier. Day-to-Day tasks are continuously becoming computerized. Nowadays a lot people prefer to do their work electronically. To the best of knowledge we have, the process of recording attendance of the students at the university is still manual. Faculties go through attendance sheets and signed papers manually to record attendance. This is very slow, inefficient and time-consuming process. The main aim of the project is to offer system that simplify and automate the process of recording and tracking students' attendance through facial recognition technology. It uses biometric technology to identify or verify a person from a digital image or surveillance video. Facial recognition is widely used nowadays in different areas such as universities, banks, airports, offices etc. We will use pre-processing techniques to detect, recognize and verify the captured faces like LBPH method. We aim to provide a software that will make the attendance process fast and precise. The problem is identified along with solutions and project path. Furthermore, detailed software analysis and design, user interface, methods and the estimated results are presented through our documentation.

Keywords: Face detection Face recognition Local Binary Pattern Student's attendance system, Haar cascade classifier, LBPH algorithm.

I. INTRODUCTION

In today's world, the need to maintain the security of information or physical property is becoming both increasingly important and difficult [44]. From time to time we hear about the crimes of credit card fraud, computer break in's by hackers, or security breaches in a company or government building [1].

In most of these crimes, the culprits were taking advantage of a fundamental defect in the conventional access control system; the systems do not allow access by "who we are!", but by "what we have!", such as ID's, keys, passcode, PIN, or Father's maiden name [12].

None of these means are really define us. Recently, technology became available to allow verification of a person's true identity. This technology is based in a field called "Biometrics".

Biometric access control are automated ways recognizing the identity of a person on the basis of some physiological characteristics, such as facial features or fingerprints, or some aspects of the human's behaviour, like his/her handwriting style or keystroke patterns [18]. Since biometric systems identify a person by biological characteristics, they are difficult to forge [28]. Facial recognition is one of those biometric methods that possess the advantage of both high accuracy and low intrusiveness. For the same reason, since the early 70's, facial recognition has drawn the attention of researchers in fields from security, psychology, and image processing, to computer vision [58].



1.1 Limitations of other System:

| Types of the Attendance systems | Limitation |
|---------------------------------|---|
| RFID-based system | Fraudulent usage |
| Fingerprint-based system | Time consuming for students to wait and give their attendance |
| Iris-based system | Disturbs the privacy of the user |
| Wireless-based system | Very bad performance if topography is poor |

There are two stages in Face Recognition Based Attendance System: -

1.2 Face Detection: Face Detection is a method of detecting faces in the photos captured by an image source. It is the first and the most essential step needed for face recognition [21]. It mainly comes under object detection like for example bus in an image or any face in an image and can use in many areas such as security, bio-metrics, law enforcement, entertainment, personal safety, etc [38].

1.3 Face Recognition: Face Recognition is a method of identifying or verifying a person from images and videos that are captured through a video source [17]. Its role is to recognize people in photograph, video, or in real-time.

II. REVIEW OF LITERATURE

2.1. E.Varadharajan et al., proposed another participation the executives framework utilized by biometric idea. This framework consequently replaces the conventional strategy [22]. Conventional strategies are a tedious procedure and support of the framework is additionally exceptionally troublesome [44]. Now make the participation procedure with human contact. Here the camera is introduced in the study hall to gather the facial images and contrasted and the put away picture lastly the participation of the understudy is stamped. The understudy is missing in the class, the framework will naturally send the SMS message to the put away contact people groups like guardians. Now Eigen face strategy is utilized to distinguish the faces issue of face recognition.[1].

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2.2 C.B.Yuvaraj, et al., is building up another framework for record the understudy participation utilizing facial highlights. Process technique is divided into 4 stages. The stages are face identification, name the faces, train the information and mark the dataset dependent on named information. The classifier is utilized to identify the appearances captured. The info pictures are gotten from the study hall [2].

2.3 Smit Hapani et al., constructed a framework used to gather the images from video and identify the understudy by utilizing the highlights of their face [3]. The principle goal of this framework is to take the participation consequently with no human assistance. Right now are perceives utilizing Viola Jones calculation with Fisher Face calculation to bring exactness of 45 % to half. [31].

2.4 Nandhini R et al., structure an undertaking for the understudies utilizing PC procedures to distinguish the human countenances. Profound learning calculation is utilized to differentiate between the appearances from video pictures from the class. So the participation will be stamped consequently [4].

2.5 Navesh Sallawar et al., portrays in his paper the participation are stamped naturally utilizing genuine information from the homeroom. The information recorded from the camera joined in the study halls. The images are ceaselessly caught, contrasted and the put away information. This creator proposed another engineering for stamping participation for the understudies [8]

2.6 Sathyanarayana N et al., build another undertaking to differentiate understudy faces. The fundamental point this venture is to recognize the countenances and give the subtleties of the distinguished faces like name and ID number. The specific system is rehashed at regular intervals to guarantee the nearness of the understudies [11].

2.7 Ashish Choudhary et al., means to check the participation in coded way. The image source is introduced in the front of the classroom at that point recognize the individual understudy faces and imprint the participation. The entire procedure is done naturally. The image source introduced will snap a photograph of the entire room, trailed by distinguishing singular faces in the image, perceiving the understudies and afterward refreshing their participation [33]. The pictures are gathered in the beginning of the class hour and the completion time [7].

2.8 Anusaya Tantak et al., proposed a framework for understudies and staff personnel. The understudy and staff faces are record by image source that is introduced inside the classroom. The recorded images contrasted and the as of now kept aside the images and recognize the participation [9].

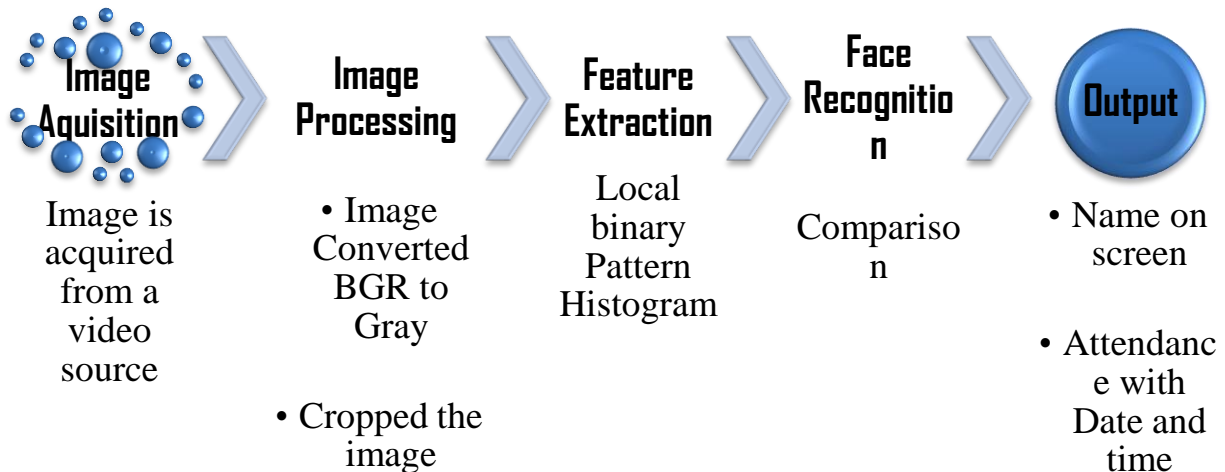
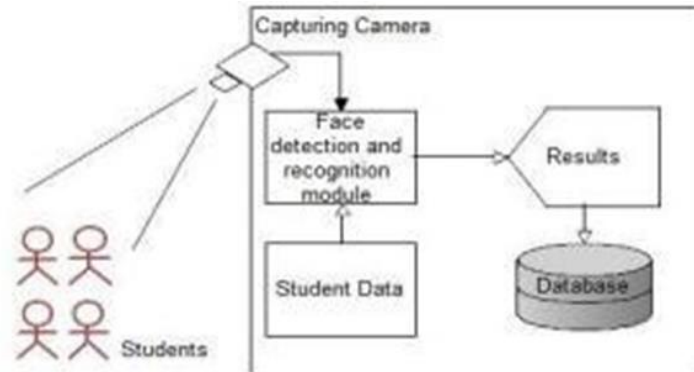
2.9 Smart Attendance Monitoring System: A Face Recognition based Attendance System for Classroom Environment [11] proposed an attendance system that overcomes the problem of the manual method of existing system. It is facial recognition technique to mark the attendance. The system even captures the facial expression lighting and pose of an individual for marking attendance.

2.10 Class Room Attendance System using the automatic face recognition System [24] a replacement approach a 3D facial model introduced to spot a student's face within a classroom, which can be used for the marking attendance. These analytical researches will help to produce student's identification in automated attendance system. It recognizes face from photos or videos stream to record their attendance to gauge their performance.

2.11 RFID based attendance system is used to record attendance, need to place RFID [15] and ID on the card reader based on the RFID based attendance to save the recorded attendance from the database and connect the system to the PC, here RS232 is used [48]. The problem of fraudulent access is going to create an issue in this method. For instance, like every hacker will authorize using ID and enters into the organization.

III. PROPOSED METHOD

A throughout survey has revealed that various methods and combination of these methods can be applied in development of a new face recognition system [52]. Among the many possible approaches, we have decided to use a combination of knowledge-based methods for face detection part and Nodal point comparison for face recognition part [15]. The main reason in this selection is their smooth applicability and reliability issues [52]. Our facial recognition system approach is given in Figure.



IV. WORKING

The main motive of these stages is to change over the images into numerical information. The gathered pictures are changed over into grayscale picture. After the transformation a wide range of tasks are done on the picture.

a. Picture Pre-processing

Now images quality is improved by using different strategies.

b. Face Detection

The captured images are sent to the identification module. This is the initial step of face recognizable proof procedure. Countenances are distinguished dependent on facial attributes or structure of the face. Now LPBH calculation is used for face recognition. After the face identification the pictures are edited and send to the further errand.

c. Face Recognition

This is the following task after the face recognition step. The trimmed pictures are contrasted and put away pictures. Face acknowledgment includes different systems like component extraction and highlight order.



d. Preparing Datasets

Image Source delivers the images which are contrasted and added to the existing images in the database.

e. Participation Generation

Now participation is produced depending on the highlights of a person’s face or structure of the face. The below figure demonstrates the computational strides of the LBPH calculation.

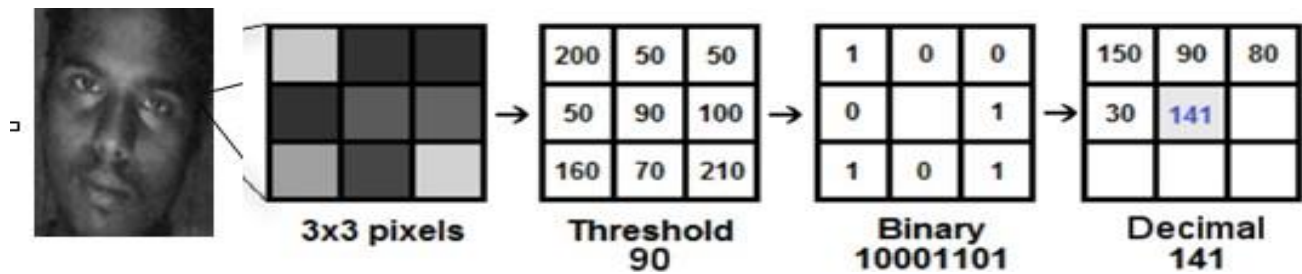


Fig. LBPH Algorithm [22]

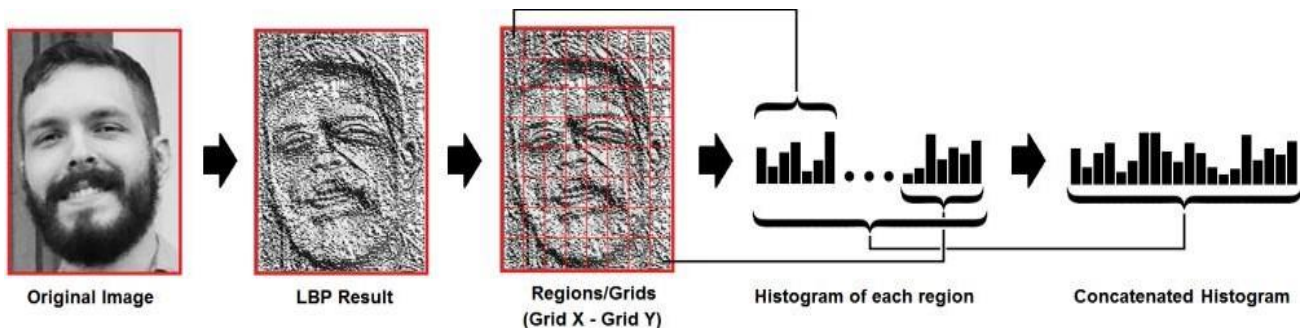


Figure 4 Circular LBP [22]

f. Results and Discussion

Before the understudies going into the class the camera captures the images. After that this framework contrasts the caught information and put away information. In the event that the match is found it show the person’s ID and result is put away in the database. The task principally relies upon the pixels of the image source (Camera). The participation ought to be determined dependent on the time. On the off chance that an individual should introduce at-least seventy of the class timing, at that point it should stamp as present. In any case naturally it will be set apart as missing [24].



V. SYSTEM FLOW:

Steps Involved:

Step 1: First of all, it captures the input image.

Step 2: After capturing the image it will pre-process the image and converts the image from BGR to Gray.

Step 3: By using Haar Cascade Classifier, the process of face detection will be done and this classifier will extract features from the image and then those information are stored in trained set database.

Step 4: Similarly, the process of face recognition is carried out using Local Binary Patterns Histogram (LBPH).

Step 5: And then extracted features which are concatenated histograms will be compared with the trained data set.

Step 6: If the histogram matches with any of the other from the trained images attendance will be updated in the attendance file.

Step 7: If not matches attendance will not be updated in the attendance folder.

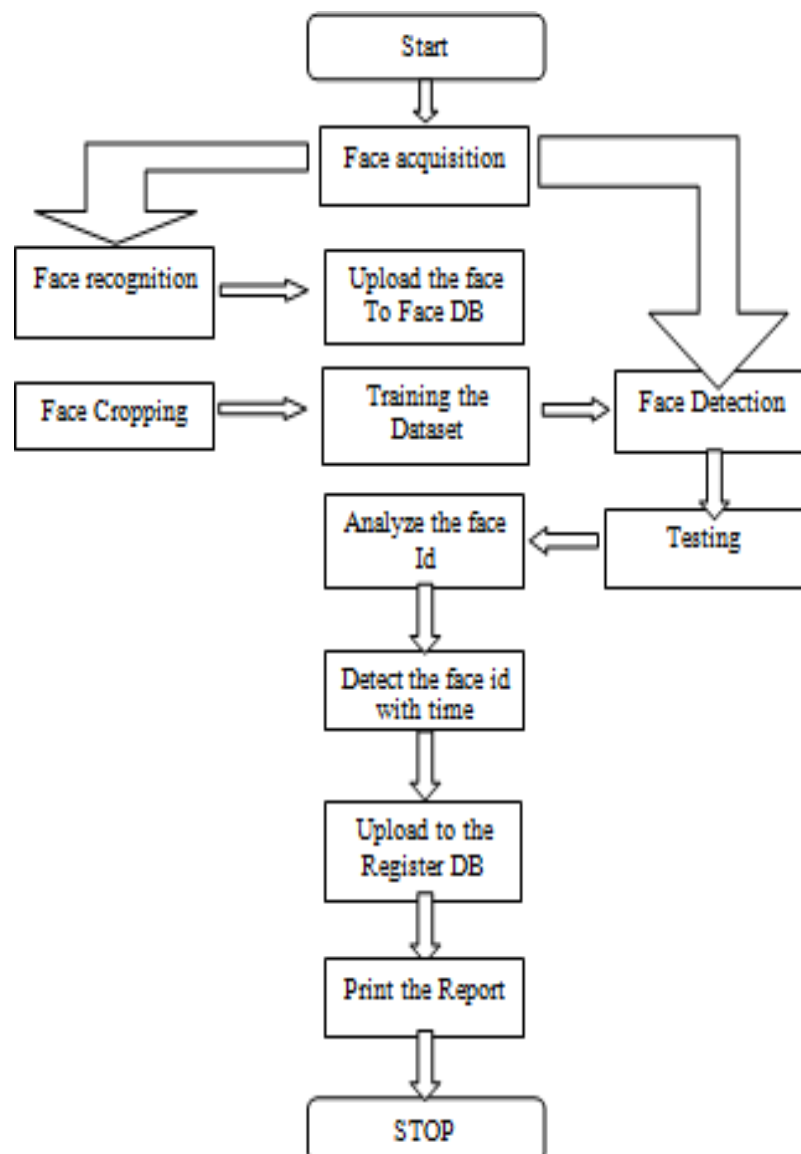
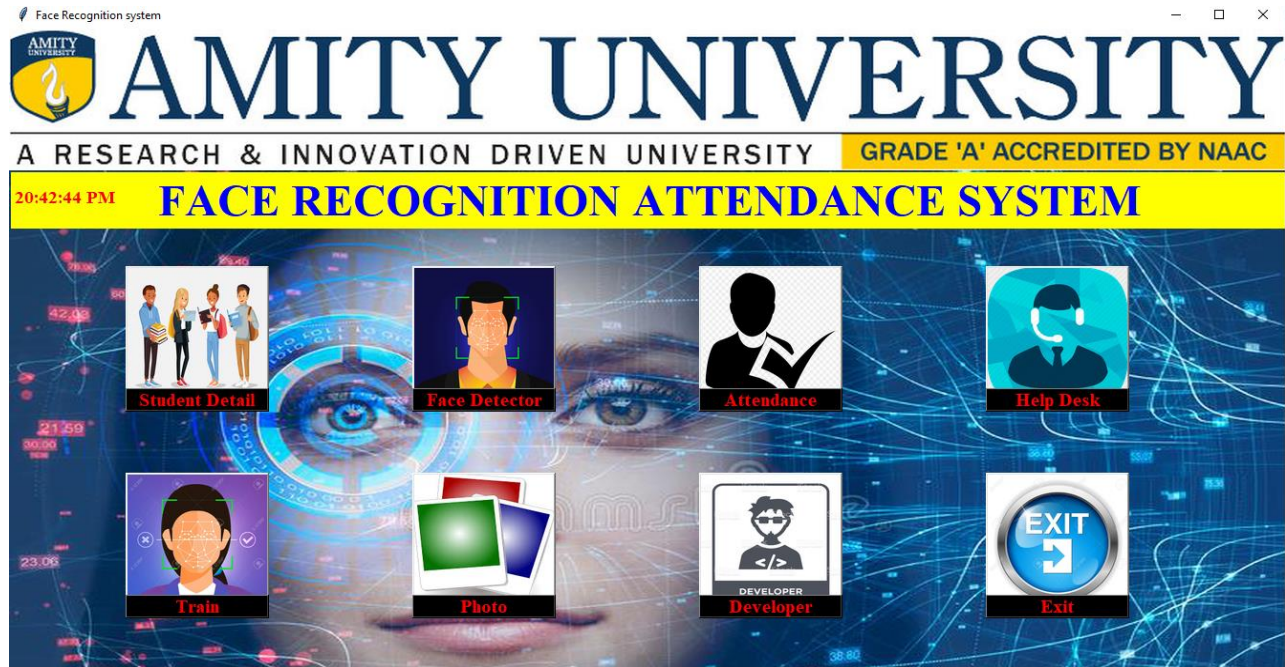


Fig. Working Flow

Sample Output:

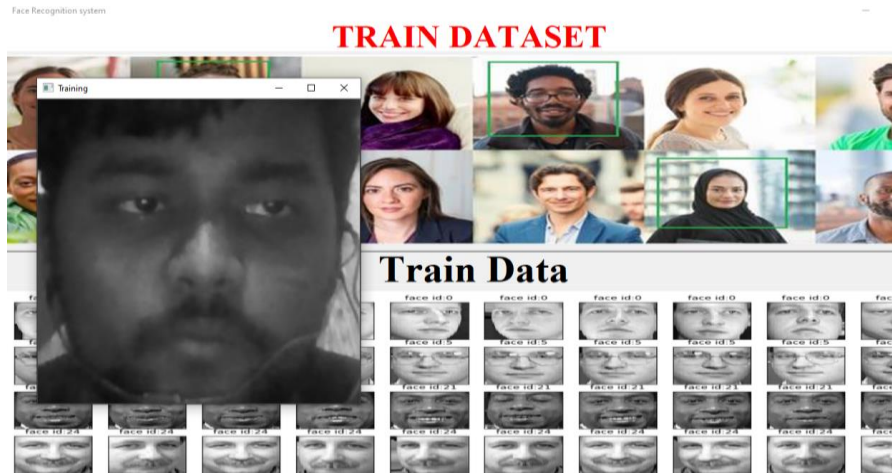
1. Front Interface



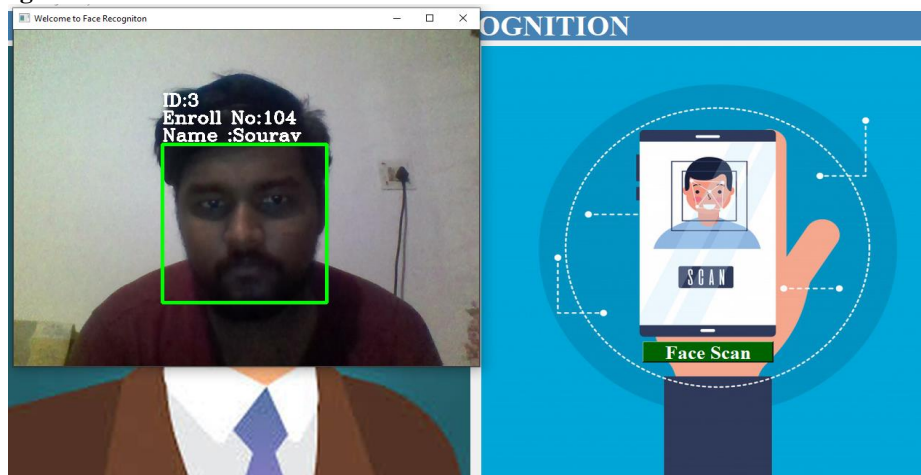
2. Student Details Management



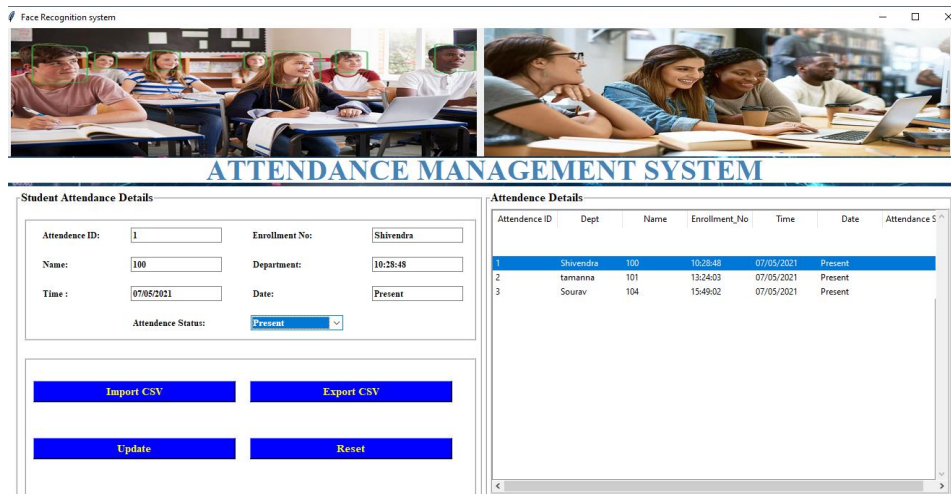
3. Training



4. Face Recognition



5. Attendance





VI. CONCLUSION:

There may be various types of light conditions, seating arrangements and environmental factors in various study halls. Most of these situations have been tested on the system and the system has shown 100% proficiency in most of the test cases. There may also exist students showing various facial expressions, varying hair styles, beard, spectacles, scarf etc. All of these cases are carefully considered and tested to obtain a high level of accuracy and efficiency. Thus, it can be concluded from the above demonstrations that a reliable, secure, fast and an efficient software has been developed replacing a manual and unreliable system. This system can further be implemented for better results regarding the management of attendance and leaves. The system will save tremendous amount of time, reduce the amount of work the administration has to do and will replace the stationery material with electronic equipment and reduces the amount of human resource required for the attendance purpose. Hence a system with expected results has been developed but there is still more room for improvisation.

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BIOGRAPHIES



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