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Eye Movement Tracking using Radial Basis Function Networks

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Abstract

This paper proposes a Radial Basis Function Network (RBFN) for the path way of eye progress. Depends on space and time the eye progress information is extracted from the video through this technique. The tracking of eye motion is dominant and worked out by the RBFN from the transmitter to receiver end. From this information, the pedestal pattern is twisted to create a calculation pattern. The eye progress calculation is customized using a resolution based advance, with a entry to distinguish the various condition of eyes like eyes totally open, eyes partially open or partially closed and eyes totally closed between the consecutive borders. The precision of the eye progress is broadcasted with the help of number of nodules in the unseen coating and erudition feature. The number of nodules in the unseen coating is 49, and the erudition feature is 0.9. In rebuilding the path way of eye progress accurately, is about 97.45%.

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1. Introduction

During the past years video tape programming tasks such as videotape seminar, live instruction via telecommunication facilities have gained generous interest .The broadcast of picture series needs high demands on storage space, giving out control and bandwidth of agreements. Ordinary arrangements afford only little bit-rates and un-compacted videotape cannot handle the data arising when broadcasting like POTS, ISDN and much computer arrangements. Therefore programming of the series is essential. Programming designs like H.263 and MPEG-1 or 2 have been enlarged, achieving density factors of about 1:100 with acceptable quality [1, 2]. The use of replica-based coding methods like JPEG improves solidity providing us with the opportunity of interactive handling of the scene content. The main idea of representation based programming is to create a virtual 3-Dimensional world with distinct 3-Dimensional things that are described by their profile and quality. To specify how the things are moving and deforming is . The shape of the things has to be broadcasted only once, and can be described in all following borders with few things specifying the location and deformation of the things. The 2-Dimensional image series can ultimately rebuilt by rendering the earth using Mainframe realistic methods .

2. Scope of the Work

A new method for path way of the eye progresses from the representation of touched 3D faces is introduced in the Project. 3D faces can either be created robotically from one or more photographs, or modeled directly through an intuitive user interface.

3. Survey on Video Conferencing Sets

Mainly the Video coding sets for seminar derived from JPEG Video sets. The Joint Photographic Experts Group (JPEG) is a working group under International standardized organization/International electro-technical commission in charge of the development of international sets for firmness, looseness, giving out and demonstration of photographic pictures, audio and their combination [4, 5].

A. The JPEG- Video Programming Set

To meet the challenges of future Multimedia functions and constraints, the JPEG group formally initiated a new JPEG

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usualization phase with the directive to usualize algorithms and apparatus for programming and elastic demonstration of audio-visual data.

B. Universal Right to Usability and Strong-ness in Fault Level Locations

Multimedia audio-visual data need to be broadcasted and right to used in various agreement locations, possibly under harsh fault situations (e.g. mobile channels).

C. High Inter-dynamic Functionality

Prospect Multimedia functions force term for enlarged inter-dynamic functionality to support the customer's needs. In exacting the elastic, highly inter-dynamic contact to and exploitation of audio-visual data will be of major significance. It is visualized that - in addition to predictable playback of audio and video series - the user need to right to use "content" of audio-visual data to at hand and operate/store up the data in a highly elastic way.

D. Programming of Usual and Artificial Information

JPEG will support the efficient and elastic programming and demonstration of both usual (pixel based) in addition to artificial information for the next generation graphics processors.

E. Firmness Efficiency

Enhanced programming efficiency, in exacting at especially low bit 0s below 64 kbits/s, that to be maintains an important value to be supported by the JPEG videotape set for the storage and communication of audio-visual data at a high programming efficiency and a high-quality feature of the re-builded information is required.

The JPEG videotape set will maintain the programming of rectangular size image series involves motion calculation/compensation followed by DCT-based surface coding. For the content-based functionalities where The image series contribution is of random shape and location It is extended by also programming shape and precision in sequence [6, 7].

F. JPEG Extremely Low Bit Speed Video

For inter dynamic audio-visual multimedia statements over portable and PSTN networks the provisions for good video feature at extremely low bit speeds is a key functionality continue to be sustained by the JPEG standard. Functions visualized comprising the broadcast of for videophone and video seminar functions, the access of video from remote servers for Multimedia functions, or remote surveillance, to name a few potential. In this respect the JPEG video programming set visualizes to enable a coding efficiency for bitspeeds between 5 ... 64 kbits/s which is advanced to that of already accessible sets.

The independent committee that created it as a standard for photography compression, which was approved in 1994 as ISO 10918-1. The JPEG standard refers to both the technique for compressing an image into a stream of bytes and then decompressing it back close to its original form, and the file format holding that stream. It is suited for"Call for Proposals" for video coding algorithms and tools and an extensive trying of the presentation of these algorithms in formal subjective tests. It is suited on all Platforms.

The JPEG Video in general, supports the coding of multiple "Video Object Planes" (VOP's) as images of subjective shape to support many of the content-based functionality using an enlarged core programming algorithm. Thus the image series input for the JPEG Video VM is in general considered to be of arbitrary shape - and the shape and location of a VOP within a reference window may vary over time. However, the programming of standard rectangular image input series at very low bit rates is supported using the JPEG Core programmer [10].

G. Jpeg Artificial/Usual Hybrid Programming

For the firmness of Video using 3D face model extraction from the Video borders is artificial/Usual Hybrid Coding (SNHC) format for Body energy (BE) by using the JPEG standard .Taking the example of a body object, the JPEG scene renders a artificial human body in the terminal. Body objects, represented by 3D meshes, should already be present at the recipient side. To have an JPEG energetic body model, only liveliness parameters can be sent. BE defines two different sets of data: Body Energy Parameters (BEPs) and Body classification Parameters (BCPs). Their semantics are the analog of facial energy parameters (FEPs) and facial classification parameters (FCP)s, respectively. BEPs represent limb action as joint rotations from the neutral situation (standing body, parallel feet, and arms along the sides with the palms of the hands facing inward). Similar animations and postures with different terminal body models to be created by defining the BEPs. Like FCPs, BEPs’ values are unconstrained. This means that the resulting animations may range from realistic human action to exaggerated cartoon-like characters suited, for example, to video-games. When the encoder wants stricter control over the getting terminal body model, it must send more information in the form of BCPs. BCPs define the receiving terminal geometric body model to use for rendering. A BCP can either be used to adapt the terminal model (for example, by customizing body surface, dimensions, and texture) or to transmit a completely new one. When the encoder sends a new body model to the recipient terminal, it also sends some information called Body classification Tables that describe how to animate the model with BEPs acknowledged from the input stream.

Body Interpolation Tables instead define how the getting terminal can interpolate missing BEPs from the ones contained in the computer graphics stream. This is especially useful in reducing the number of parameters to transmit to the getting terminal. To create a common architecture for human body modeling the JPEG group joined with the VRML Humanoid energy working group, combining the face and body energy together, the content creator can insert complete human avatars in a JPEG

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scene. The use of avatars is likely to become common in many different JPEG applications, including fundamental meetings, model-based video seminars , realistic networked video games, and so on.

4. Methodology

Three categories of the frames were removed from the video, corresponding to fully open, half open or closed and fully closed. For all the three categories a suitable target value is assigned. A RBFN is instructed to identify and track the eye progress from the sending to receiving end. The inputs to RBFN are the segmented values achieved after applying marker controlled watershed segmentation to the initial set of frames. The architectural design for tracking eye progresses in a video from transmission side to receiver side is depicted in Figure 1. The input frames used for eye progress tracking is shown in Figure 2.

5. Results and Discussion

By using MATLAB 2019 the scheme is executed. The instant taken for tracking eye progress with respect to each border is approximately 1.24 seconds. This includes segmentation by marker controlled watershed segmentation and processing with RBFN. The topology for RBFN is 121 x 49 x 1. The mean squared error of 0.0009 was used to stop the training process. The total number of frames extracted from this video is 80. For this experiment, only 40 borders (Figure 5) are measured, which show significant transforms in the eye progresses.

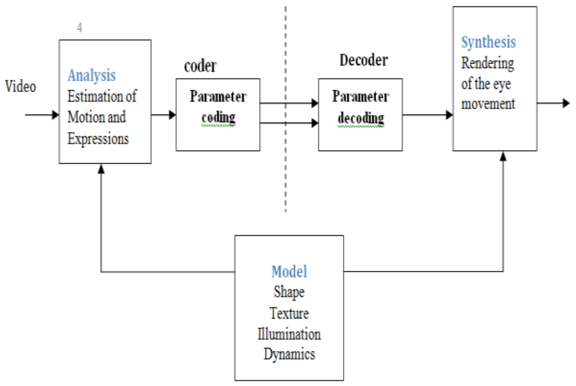

Figure 1: System Architecture for Tracking the Eye movements

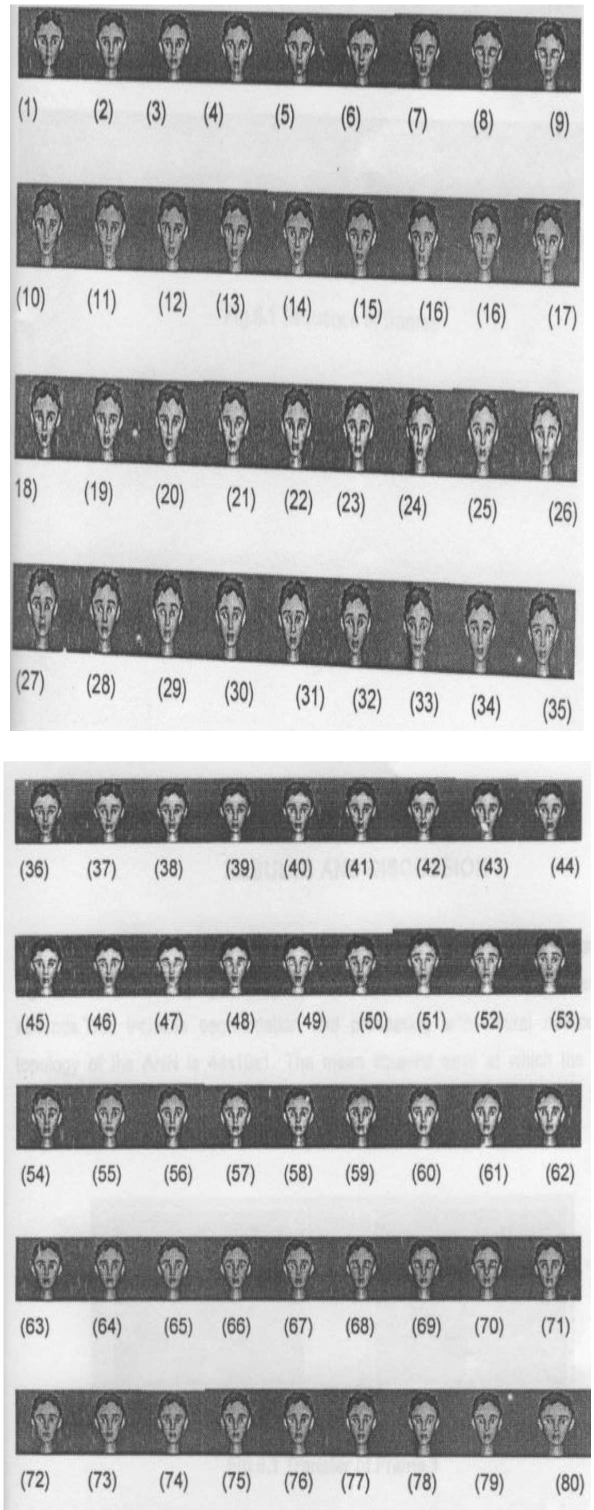

Figure 2: Input frames with Eyes fully open, half open and fully closed

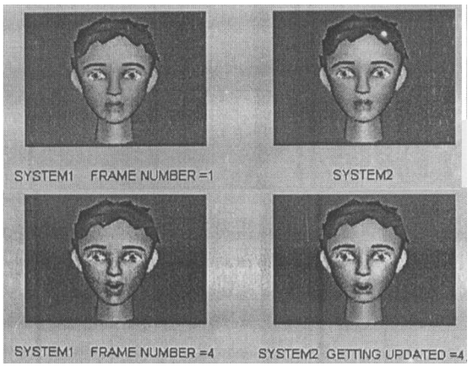

Figure 3: Video transfer from Transmitter to Receiver

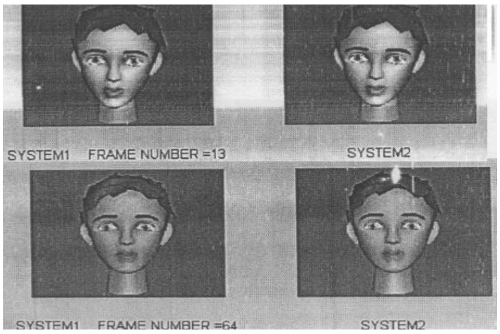

Figure 4: Detection of Fully open Eye condition for Video transfer from Transmitter to Receiver

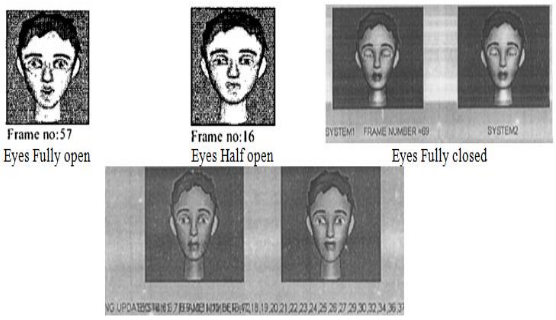

Figure 5: Detection of various Eye condition for online Video transfer from Transmitter to Receiver

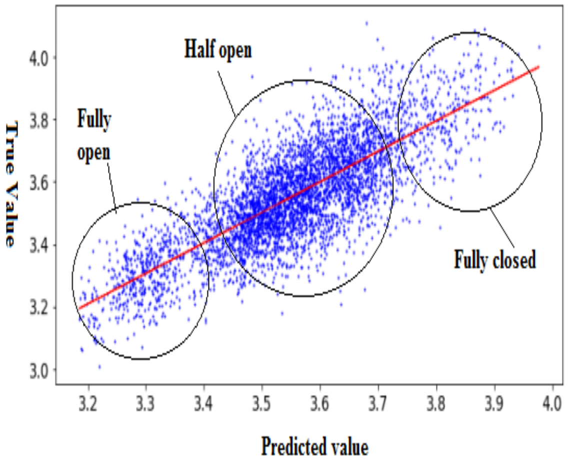

Figure 6: RBFN output in detection of the Eye condition

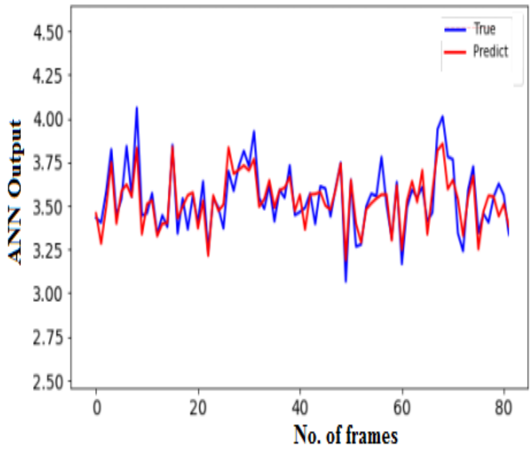

Figure 7: Eye movement tracking predicted by RBFN

6. Conclusion

In this paper, an RBFN based approach is proposed for tracking the eye progress in video transfer. The template warping is done using marker controlled watershed segmentation and RBFN for quick decision of frame updating, and eye progress tracking is implemented. The Mean Squared Error value used was 0.0009 and the learning parameter as 0.9 for training the RBFN. The accuracy of tracked eye progressess, is about 97.45%. Applications of this method in facial expression tracking can be expressed for other parts of face.

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