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Secure Crowd-sourced Photography

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Abstract

A system for detecting an important event/occasion and automatic capturing of image/video is disclosed. A photographer AI (artificial intelligence) app is installed on a mobile device of each user. The users (who are going out on an event) are connected in a peer-to-peer network on the photographer AI app. Each user shares her/his live location on a platform of the photographer AI app. The photographer AI app determines whether a subset of the users is in proximity (i.e. in range and in a frame) for a good picture. The subset of users in the proximity is determined using their live locations and a location sensor of the mobile device. An HMD (Head Mounted Display) device wirelessly interfaces with the photographer AI app. A camera, embedded in the HMD device, captures a video of the surroundings. The video is fed as an input to a trained photographer AI (artificial intelligence) function if the subset of the users is in the proximity for a good picture. The trained photographer AI function detects an emotion associated with the subset of the users in the video. If a positive emotion such as laughter, cheerful screaming for the subset of the users is detected, the camera starts capturing image(s)/video(s). A person identification module of the photographer AI app identifies user(s) in the subset of the users. The captured image(s)/video(s) is/are sent to the platform of the photographer AI app and are encrypted using encryption key(s). The encryption key(s) is/are owned by the user(s) in the subset of the users.

Problem statement

Clicking pictures has become quite a norm these days to capture important life events. But the user is engaged in the event, and manually pulling out a digital camera or a smartphone might distract her/him from the ongoing event. The user might miss out on important and memorable moments of the event in the process of manual handling of the camera/capturing device. Also, the user might be more interested in enjoying the moments rather than capturing the same. The present disclosure endeavors to address this using an automatic capturing system that takes charge for identifying relevant moments to capture, capturing and saving/storing image/video files for the user. This automatic capturing system mitigates an overhead of pulling out the camera and setting it up for capturing image(s)/video(s).

System and working

The present disclosure describes an automatic capturing system that enables users connected via a peer-to-peer network to capture each other's images automatically and effortlessly.

The automatic capturing system (as shown in Figure 1) comprises:

i. A photographer AI app
ii. An HMD (Head Mounted Display) device

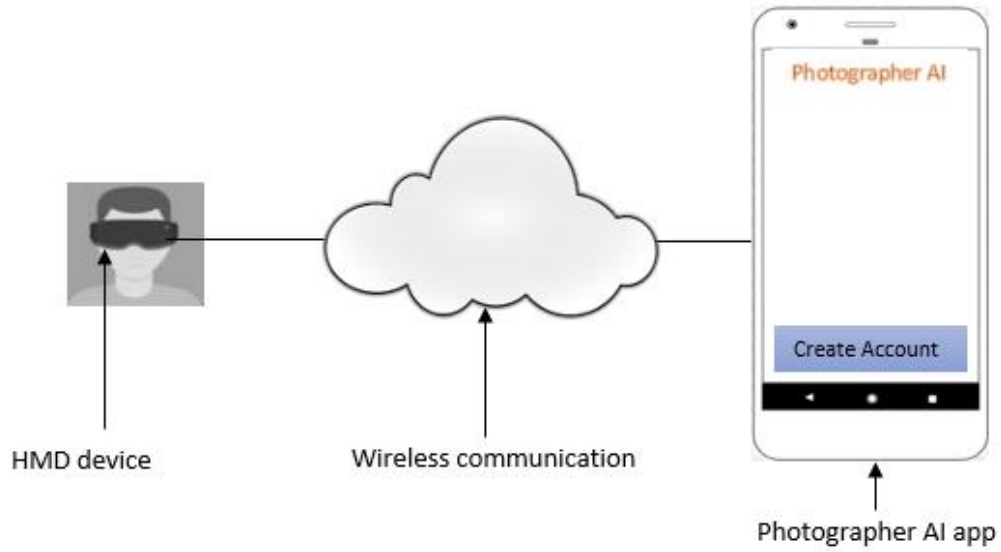

Figure 1: The HMD device wirelessly interfaces with the photographer AI app

The photographer AI app includes following components:

- A photographer function
- A person identification module

The photographer AI app is installed on a mobile device of each user. Each user uploads her/his pictures to a platform of the photographer AI app for her/his identification. These pictures are given as inputs to the person identification module of the photographer AI app. The photographer AI app implements the peer-to-peer network. Each user may make a public connection with other user(s) on the photographer AI app using the peer-to-peer network. The users connected via the peer-to-peer network go out to attend

events in a social setting (as shown in Figure 2(a) and Figure 2(b)). Each user is wearing the HMD device. A camera is embedded in the HMD device. The camera keeps on capturing a video of the surroundings and sends it to the photographer AI app. Each user turns on a location sensor of her/his mobile device and shares her/his live location on the platform of the photographer AI app. The photographer AI app keeps on comparing the live location of the mobile device with the live location(s) shared by a subset of the users (i.e. other users).

The photographer AI app determines a set of Euclidean distances between the live location of the mobile device and each live location of the subset of the users. If at least one of the Euclidean distances is below a threshold value (i.e. at least two users are in the proximity), the video of surroundings is given as an input to the photographer function.

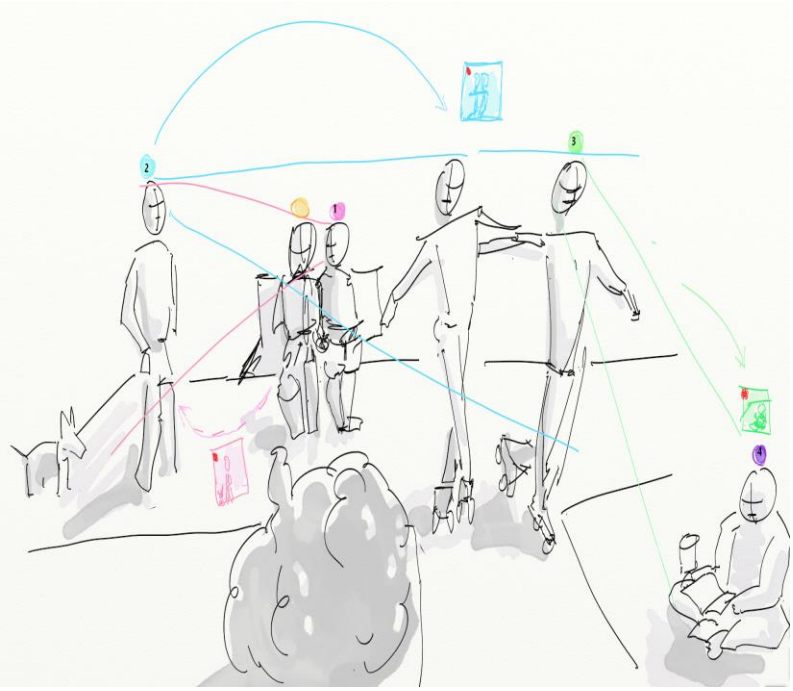

Figure 2(a): The users connected via a peer-to-peer network

Figure 2(b): Images captured automatically while skating

The photographer function is a machine learning model trained on millions of images and videos. A face detection algorithm of the photographer function detects face(s) in every frame of the video. Features are extracted from the face in every frame using a Euclidean distance among facial landmarks. The

photographer function stores reference values of each feature (shown as feature x' in Figure 3) for different emotions such as laughter, social cues, cheerful screaming, etc. A plurality of subtractors (as shown in Figure 3) obtains differences between values of the features extracted and the reference values of the features. An SVM classifier analyzes the differences obtained by the plurality of subtractors. It classifies the emotion into one of the categories – positive emotion, inactive or no emotion. If a positive emotion such as cheerfulness, joy or surprise, etc. is detected, a command is sent to the camera of the HMD to click image(s) or start recording the video(s).

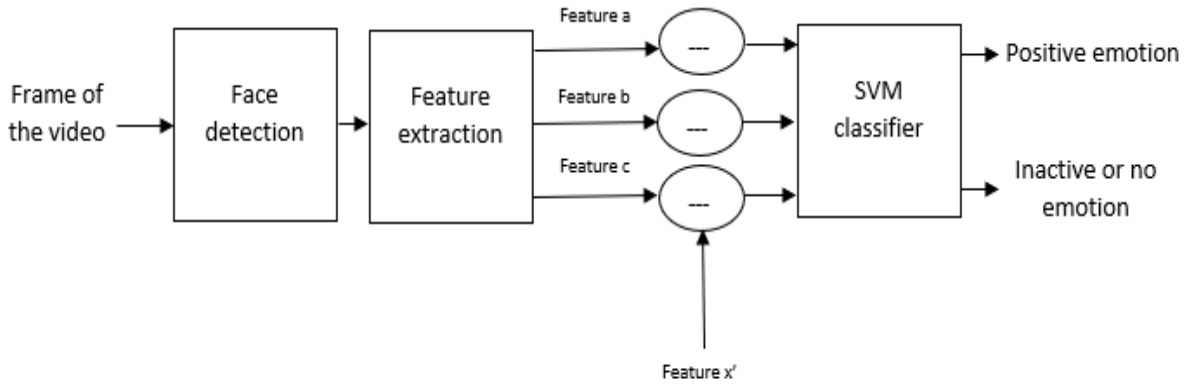

Figure 3: Architecture of the photographer function

The person identification module recognizes a subset of the users in the image(s) or the video(s) being captured. The captured image(s) and the video(s) are sent to the platform of the photographer AI app and are encrypted using encryption key(s). The user(s) in the subset of the users hold(s) the encryption key(s) on their platform(s) of the photographer AI app. The user(s) in the subset of the users can approve or reject the image(s) or the video(s) captured. All the users can see the image(s) or video(s) only if approved by all the user(s) in the subset of the users.

Additional Embodiments

In one embodiment, the automatic capturing system includes a microphone embedded in the HMD device. The microphone detects sound signals of the user(s) in the subset of the users. The automatic capturing system utilizes pattern matching to compare the detected sound signals with signals from a library of sounds. The library of sounds may be stored in a database. If the detected sound is classified as

a voice, speech recognition is performed. The automatic capturing system conducts sentiment analysis on the recognized speech to identify emotional sentiments. Emotional sentiments include positive sentiments and negative sentiments. Examples of positive sentiments are laughter, cheerfulness, happiness, pleasure, gladness, etc. Examples of negative sentiments are grief, sorrow, sadness, etc. If positive sentiments are identified, a triggering message is sent to the camera for capturing image(s) or recording video(s).

In an additional embodiment, the automatic capturing system is Wi-Fi enabled. It includes a switch that enables a Wireless Local Area Network (WLAN), making a network accessible to the system. The captured and approved image(s) and video(s) are wirelessly transferred to cloud accounts of the users using the WLAN.

In another embodiment, the peer-to-peer network may be utilized for sending the captured image(s) or video(s) to the mobile device of a user, who is a subject in the captured image(s) or video(s). The users turn on a “share with the subject only” mode on their mobile devices. The captured image(s) or video(s) are not transferred to the platform of the photographer AI app if the user has turned on the “share with the subject only” mode.

In yet another embodiment, the automatic capturing system may transfer the captured image(s) or video(s) on daily basis. The captured image(s) or video(s) from the day are presented to the user as a daily journal.

The disclosed idea can also be utilized in detecting suspicious or criminal activities, recording a video or capturing an image and reporting such activities.

Conclusion

With the advancement in technology, efforts are being made to reduce human intervention in handling of a capturing device. Pulling out a digital camera manually or opening a camera app on a smartphone and adjusting settings of the camera before clicking a picture might be quite an effort at times. Imagine, a capturing device automatically capturing pictures for you when there is a perfect shot to click. The present disclosure introduces such an automatic capturing system. The automatic capturing system leverages the power of artificial intelligence for capturing the pictures or videos of important life events on behalf of the user.