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Videoconference Group Selfies With Virtual Backgrounds

ABSTRACT

Video conference user interfaces are limited to displaying each endpoint in a corresponding box. Participants can also use virtual backgrounds. However, current video conference applications do not provide a sense of shared space. This disclosure describes techniques to replace the disparate backgrounds of individual participants in a video conference with a consistent virtual background. The replacement can be performed while the video conference is in progress and provides a consistent visual appearance to all participants. The foreground portions can be segmented to arbitrary shapes and can be overlaid in a manner that provides an aesthetically pleasing arrangement. The virtual background can be user selected or can be generated automatically based on the topic of the video conference.

KEYWORDS

- Video call
- Video conference
- Virtual background
- Group selfie
- Background segmentation
- Face extraction

BACKGROUND

With the advent of consumer and enterprise products that include video calling/ video conferencing features, users are getting together online in virtual space. In such online meetings, users typically participate using a webcam of their computer, or an on-board camera of a device such as a smartphone, tablet, smart display, or other devices.
Some video conferencing applications include a feature to replace the background of a participating user with a virtual background, e.g., replace a cluttered living room background with beach background, an office background, or any other background, as selected by the user. For example, the user can select from an available default set of background images, or set one of their own pictures as the background. Such background selections are specific to each participating endpoint.

When a large number of users participate in a video conference with each being displayed in a small window, each window may be too small for the background to be perceived. Also, since different endpoints use different backgrounds, the video conference doesn’t provide an experience of everyone sharing a social moment together.

DESCRIPTION

While group selfies in the real world are commonplace, there is no current solution to create group selfies of users that participate in a video conference. Capturing photos of virtual events hosted via video conferencing is limited to capturing a screenshot of the user interface of the video conference application. In such cases, the configurations in which the group video feed is displayed are fixed, making every videoconference look similar. Fig. 1 shows examples of different video conference user interfaces. Such image capture cannot substitute for fun group selfies that users take in real life, e.g., using wide angle selfie cameras on their phones or other devices.
This disclosure describes techniques to replace the disparate backgrounds of individual participants in a video conference with a consistent virtual background. The replacement can be performed while the video conference is in progress to provide a consistent visual appearance. The arrangement of tiles, with each tile depicting video from a particular participant endpoint, is made consistent so that all participants see all faces arranged in the same way.

Further, the arrangement is such that tiles that depict video from individual endpoints are not restricted to a simple box and can have flexible shapes, e.g., corresponding to face size and...
shapes. After subtracting the background, foreground objects, e.g., faces and other objects that are closer to the camera than the faces, can be segmented into arbitrary shapes. The video feed received from each source is processed to separate the face and body from the background and the video frames thus obtained are overlapped. The arbitrary shapes thus obtained can then be combined such that more faces fit into the video conference user interface or faces are displayed at a larger size.

The combined non-face background of the entire video stream is separated and replaced with a single background image or video, as illustrated in Fig. 2 below. The same individuals that participate in the video conference shown in Fig. 1 are depicted in Fig. 2 in a different arrangement and with a shared virtual background.
Participants in the video conference can upload different backgrounds. Further, with user permission, thematic backgrounds can be suggested based on the title of the video conference or other user-permitted data. As seen in Fig. 2, the video conference is a birthday party for the user Niu. Accordingly, a virtual background includes a virtual happy birthday banner is generated and included in the video conference. As seen in Fig. 2, the banner includes the event title and date. Different types of thematic backgrounds (e.g., birthday party, dance party, conference, workout, etc.) can be automatically generated and suggested to the participants.

Participants can capture a group selfie during the video conference. The images of individual participants can be laid out automatically in a variety of ways and be made user-editable to provide users with customizable and fun video conference group selfies.

The described techniques can be implemented in any video calling or video conferencing application. The generated group selfies can be shared via social media or other applications.

Further to the descriptions above, a user may be provided with controls allowing the user to make an election as to both if and when systems, programs or features described herein may enable collection of user information (e.g., information about a user’s calendar, video conference, social actions or activities, a user’s preferences), and if the user is sent content or communications from a server. In addition, certain data may be treated in one or more ways before it is stored or used, so that personally identifiable information is removed. For example, a user’s identity may be treated so that no personally identifiable information can be determined for the user. Thus, the user may have control over what information is collected about the user, how that information is used, and what information is provided to the user.
CONCLUSION

This disclosure describes techniques to replace the disparate backgrounds of individual participants in a video conference with a consistent virtual background. The replacement can be performed while the video conference is in progress and provides a consistent visual appearance to all participants. The foreground portions can be segmented to arbitrary shapes and can be overlaid in a manner that provides an aesthetically pleasing arrangement. The virtual background can be user selected or can be generated automatically based on the topic of the video conference.