

Cloud Services for Improved User Experience in Sharing Mobile Videos

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Outline

- 1. Introduction**
- 2. Use Cases**
- 3. Enhancement Of Mobile Video User Experience**
- 4. Mobile Video Cloud Services**
- 5. Experimental Evaluation**
- 6. Conclusions And Future Work**

Introduction

- Recently, video sharing has been extended on mobile platforms with considerable success.
- They can observe three classes of mobile video discrepancies between users, content and devices.

Introduction

- Professional video content production shifts to higher resolution formats which are not suitable for common smartphones.
- The resolution of mobile device increases, but their display capabilities will always be constrained due to the physical size of mobile devices.

Introduction

- Amateur video content shot with smartphones lacks many characteristics that create the aesthetics of professional videos.
- For example, mobile video shots are often unsteady, without a smooth pan or zoom to the objects of interest and without clear shot segmentation.

Introduction

- The limited bandwidth causes problems in seeking or browsing the video, because it may take a long time to load the video.
- This paper seeks to remedy some of the issues with UX in mobile video applications by making use of cloud services for fast and intelligent video processing.

Introduction

- They can easily extend/add custom adaptation functionalities to the video content/streams to improve the mobile UX in their apps.
- They developed our Mobile Video Cloud Services (MVCS) system for video processing in the cloud.

Use Cases

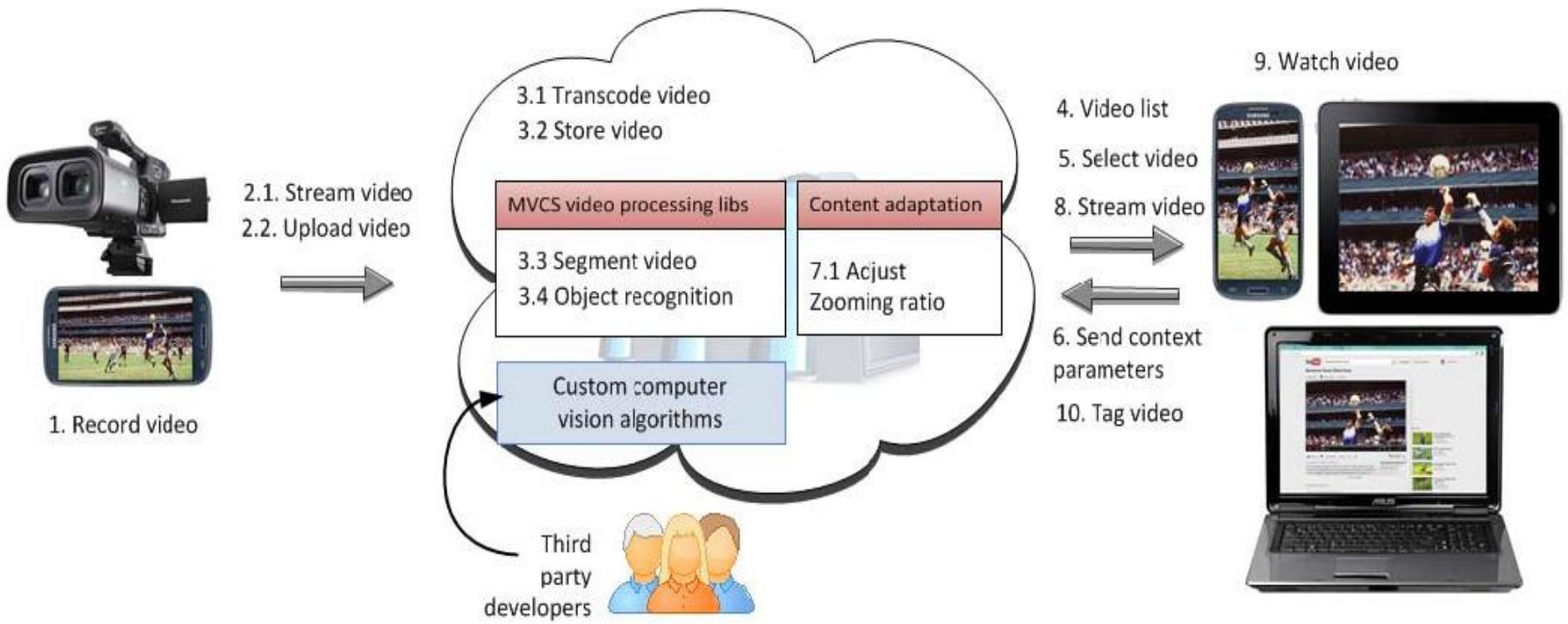


Fig. 1. MVCS workflow in a mobile video application

Enhancement Of Mobile Video User Experience

- The enhancement of mobile video UX in our setup consists of three parts.

Enhancement Of Mobile Video User Experience

segment thumbnail enables browsing by scenes



enables browsing by tags

Fig. 2. Video stream browsing based on video segmentation and automatically generated metadata

Mobile Video Cloud Services

- RTP is used for video up and down streaming.
- Its XMPP connector is the gateway to the cloud services and is used to exchange data with the cloud, including metadata, segment information, and device information like screen size, model, etc.

Mobile Video Cloud Services

- Realizing the different functionalities of the MVCS client various handler are required.
- The MP4 handler is an important part of the video streaming functionality.

Mobile Video Cloud Services

- To ensure good compatibility with various streaming servers the outgoing video stream should consist of a video encoded by the H.264 video codec and an MP4 video container.
- The RTP connector is responsible for the communication with the streaming server of recorded videos and also for delivering the video to the video player.

Mobile Video Cloud Services

- The zooming service is responsible for cropping the video.
- It provides standard zooming functionality like zooming to the middle of the video and more complex zooming functionality based on the object recognition service.

Mobile Video Cloud Services

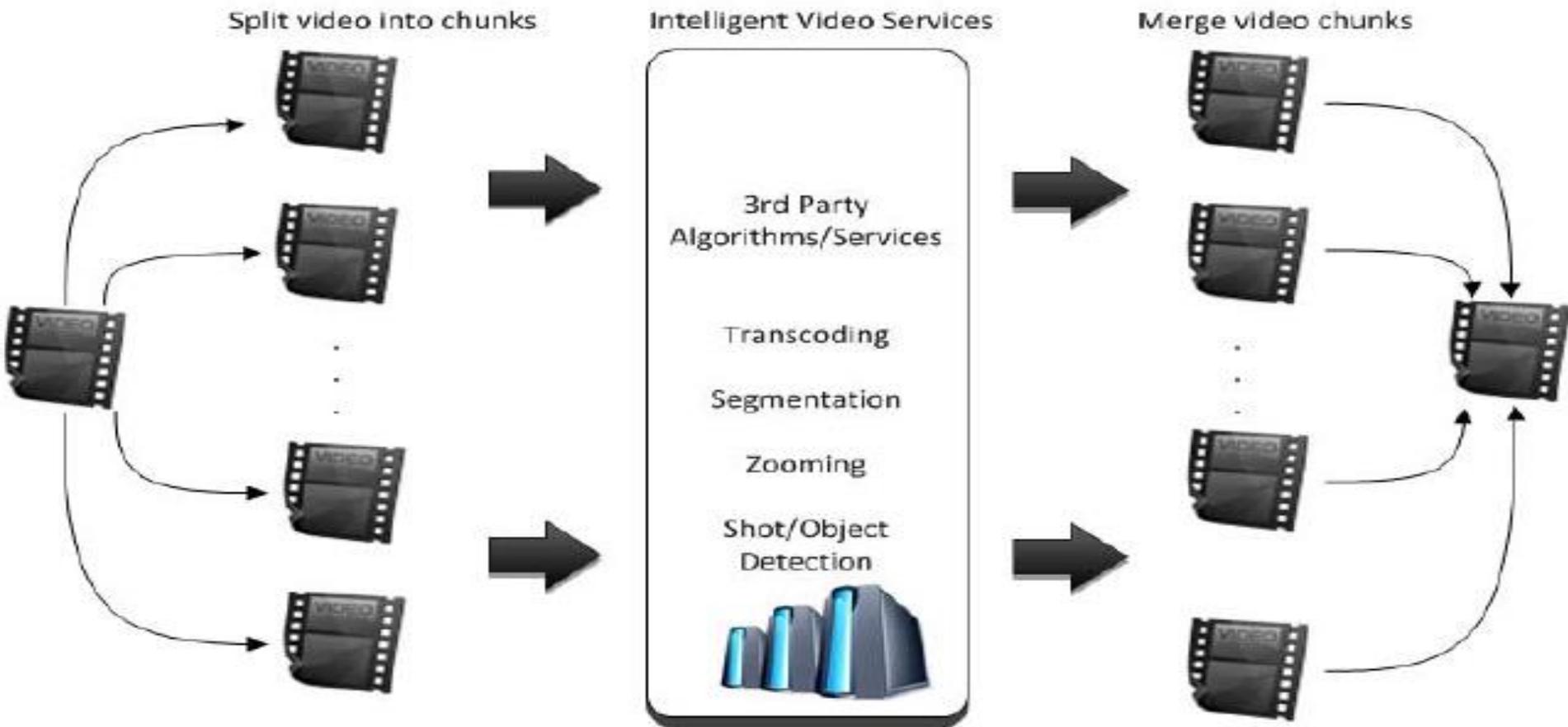


Fig. 4. Video processing workflow

Mobile Video Cloud Services

- The object recognition service is necessary for realizing ROI-enhanced zooming.
- The object recognition is realized with the Java wrapper for OpenCV, i.e. JavaCV.

Experimental Evaluation

- First, mobile user experience improvements such as zooming, segment-based and tag-based browsing are evaluated in a user study.
- Second, the advantages of video processing in the cloud are compared, especially the advantages of chunk based processing in comparison to single file processing.

Experimental Evaluation

- MVCS client has been implemented for the Android platform.
- We used HTC Desire smart phone with Android OS version 2.2, 3.7 inch wide screen multi-touch display with 480x800 pixels and 252 ppi pixel density, 1GHz CPU and 576MB RAM.

Experimental Evaluation

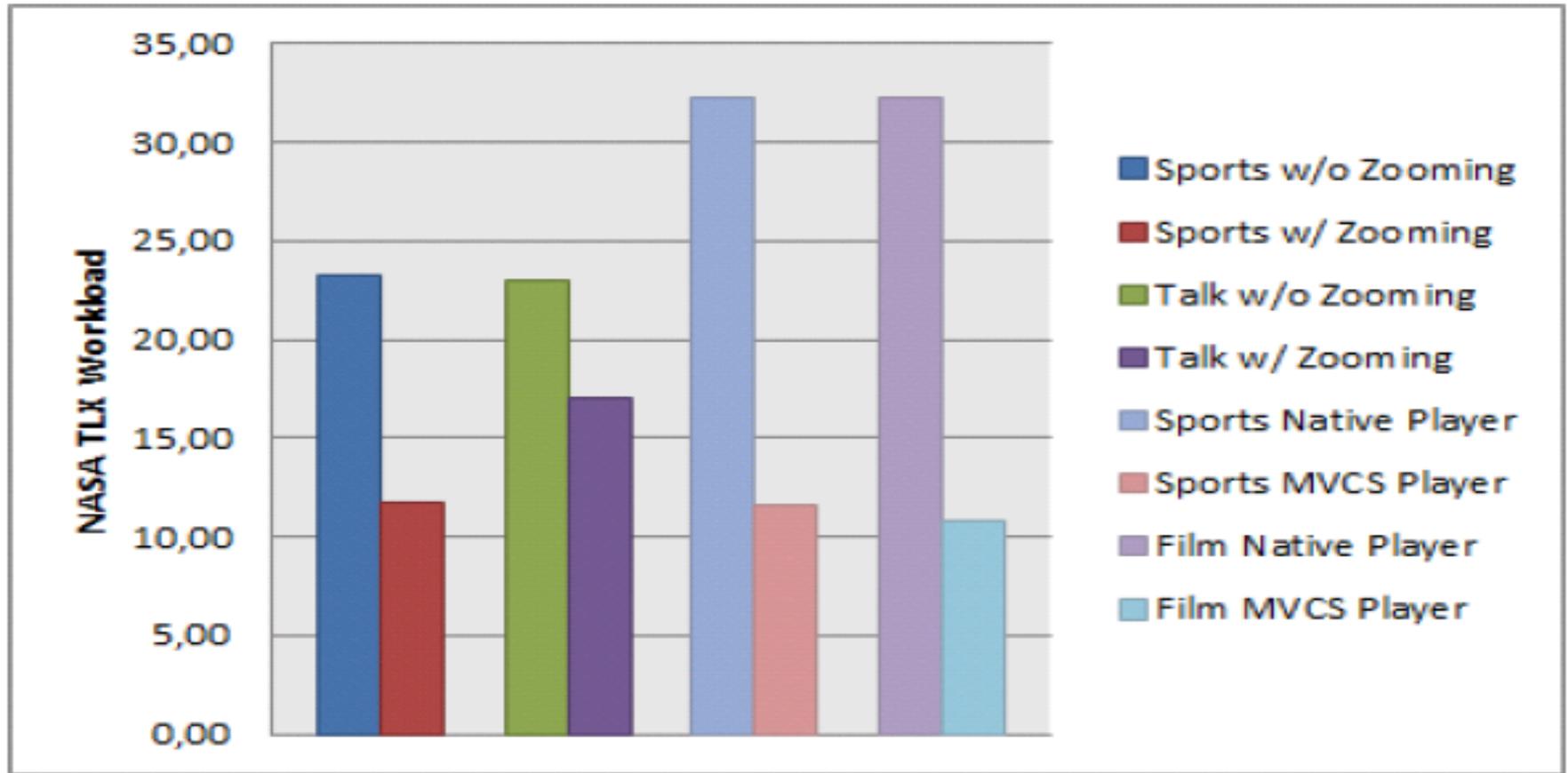


Fig. 5. NASA TLX user workload

Experimental Evaluation

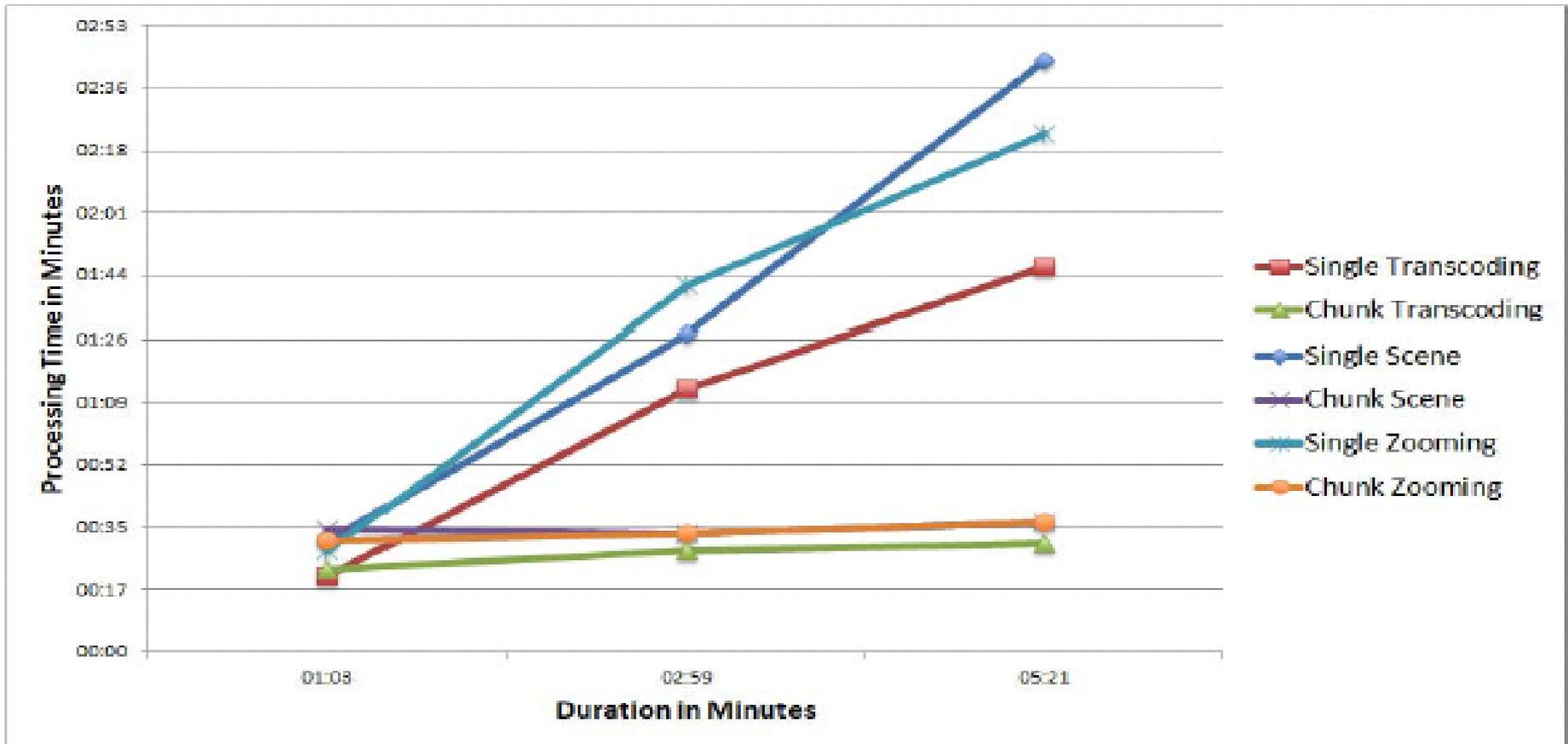


Fig. 6. Cloud processing time comparison

Conclusions

- In summary, our contributions in this paper are an open extensible cloud platform for distributed video processing and an evaluation of the platform in improvement of mobile UX.