Collaborative Video Streaming on Cell Phones

Project code: AO3-06

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Overview

Introduction

Video streaming is now very common to desktop computers, while it is still not mature in mobile devices, as the lack of internet connectivity is the greatest issue. The cell phones, however, can connect to the internet with cellular network, which is the GPRS service on GSM network as public know. The data channel (GPRS) is limited in bandwidth resource, this does not come to problems while it is used for simple tasks such as email, instant message etc. However, the bandwidth problem becomes the bottleneck of the system when it is used for video streaming. Besides replacing the GPRS with newer technology, we can come to a new solution on application level.

Objective

The project proposed is Collaborative Video Streaming on Cell Phones. As stated in titles, two cell phones which have internet connectivity are used. The project proposes the ways to share their bandwidth to improve the quality played on the devices to an acceptable level.

Project Details

H.264 Baseline Profile is used as the primary video codec. The reasons of choosing it are its high performance in low data rate and the error recovery capability provided in the tools.

Bluetooth or WIFI is used as a secondary wireless for two devices to communicate and share the data retrieved in internet, the video data should come from the same server.

Error recovery is an important feature of this project, when one device unexpected “disappear” from the system, the remaining part of the video data can be solely played on one device.
Proposed Methods of Video Partitioning into two parts (Main focus)

1. Alternative Discrete Frame Allocation

1.1. Improved with redundant frames
2. Switching Discrete Slice Allocation
- Each slice can be decoded without other slice(s)

2.1 Improved with redundant slices
- If slice 1 is allocated to A, slice 1 (redundant) is allocated to B

3. Core-Shared Scalable Allocation
- Core (Base layer) can be played directly (low quality)
- Enhancement layer adds details to improve quality
- Each unit can be a slice or a frame

3.1 Improved with FGS
- Allow utilize the bandwidth of the network by small step incremental change of data sent to devices.

Summary

<table>
<thead>
<tr>
<th>Advantage</th>
<th>Frame</th>
<th>Slice</th>
<th>Shared</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Simple</td>
<td>Low latency</td>
<td>Flexible in bandwidth utilization</td>
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Effect on missing client
- Slow motion (lower frame rate)
- Parts of video become blur/distorted
- Switch between high and low quality video