Image Processing Based Commercial Detection

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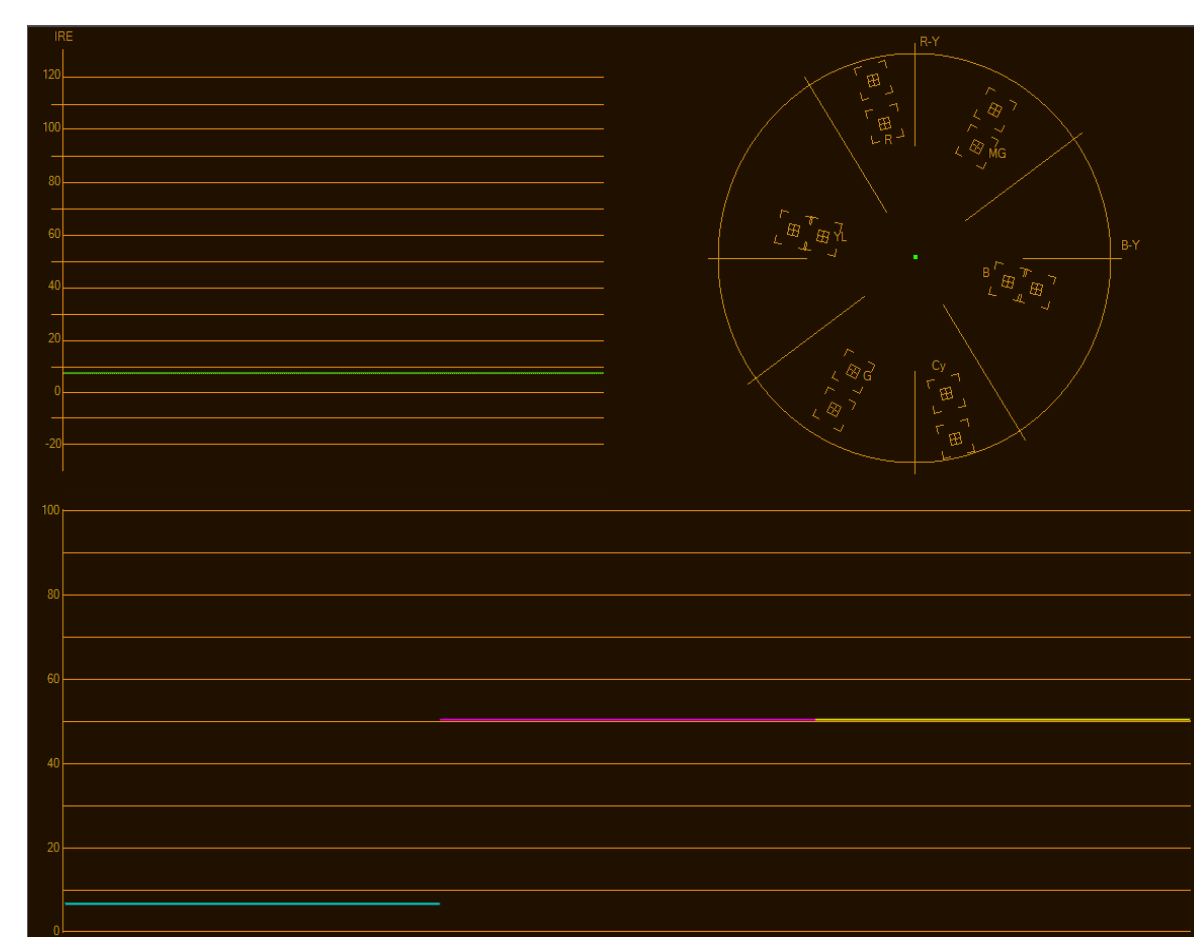
Introduction

While most people enjoy watching television programs, few enjoy having to watch or listen to the commercials that interrupt their favorite shows. Our project aims to use the audio and video signals of television programming to detect when channels switch to commercials. Our detector will identify commercials by detecting audio and visual cues that appear when a channel switches from its programming to a commercial break. The device proceeds to mute the television when the commercial comes on, sparing viewers from the annoying commercials.

Motivation

Some preliminary information that we used to gauge our success:

• Black screens easy to detect since Y Cb Cr values = "zero"

• Normal frames have color signatures that are easy to detect

Above: Y Cb Cr values at "zero"

Below: Y Cb Cr values of Frame to the right

• While trying to detect logos, the consistency of the pixel values allow us to easily tell if a logo is present or not
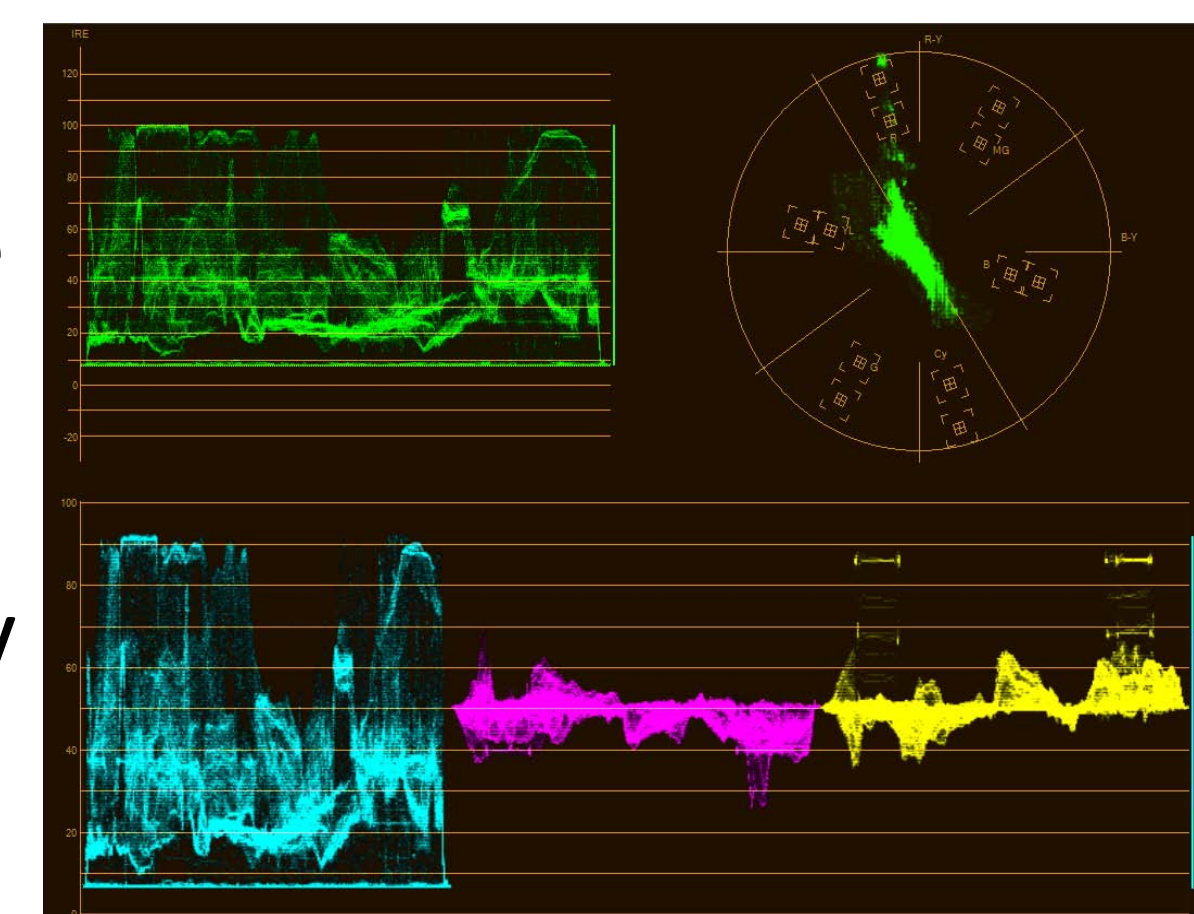
Implementation: Image

High Level Overview

Video Source (DVD Player or Cable Box) → **1** → Altera DE2 FPGA → **2** → LCD Monitor or T.V.

1. Video Source to FPGA

• Video, NTSC compliant, is output from the video source as a composite signal (RCA) and is plugged into the FPGA's "Video In" port. The audio is plugged into the "Line In" port.

• The FPGA's built in video decoder chip processes the pixels one by one as they come in, focusing on pixels inside the boxes, shown underneath.

• The audio is processed by the Wolfson WM8731 24-bit sigma-delta Best-Quality Audio CODEC

Above: Red boxes outline o f detection areas

2. FPGA to Monitor

• Depending on the whether or not our algorithm detected a commercial, the FPGA either relays the video and sound information from the decoders to the speakers and monitor, or in the event of a commercial detection, the FPGA blacks out the video and mutes the sound

EECS 452

Implementation: Audio

Using the audio feed from the television our device was able to detect audio drops between shows and commercials breaks. The algorithm signaled to the imaging algorithms that a commercial break was about to begin or end.

Above: left audio channel

Below: right audio channel
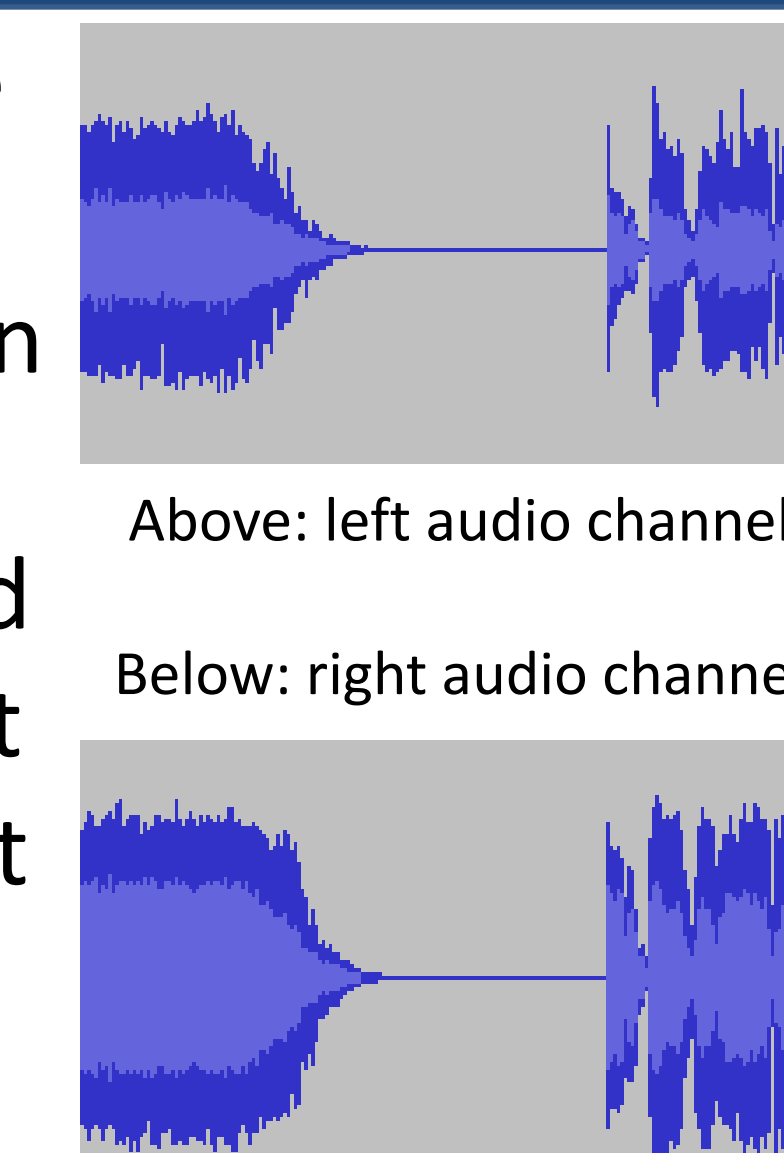
Future Work

Some future additions that could be made to increase the functionality of the detector:

• Detection for multiple video types
  • Sports
  • Movies
• Integration of SD card
  • Store music to play during commercial
  • Store images for a slideshow during commercial

Contact Information

If you have any questions or would like information about this project, please free to email us at eecs452group@umich.edu.

Acknowledgement