Risks and Planning

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The purpose of this document is to show the stages of: brainstorming, identification of risk, prioritization of risk, identification of deliverables, and division of tasks.

Contents

1 Brainstorming

There are three major sections to our project:

- Capturing
  - All tasks related to capturing all information written on the whiteboard
- Sending
  - All tasks related to sending and recieving information between devices
- Processing
  - All tasks related to processing the images once they are recieved by the linux machine

Capturing

- Decide on a camera
- Designing/purchasing a stand
- Figure out setup stuff
- Determin min/max distance from board based on camera lense and number of megapixels
- Look into rooting camera (maybe. depends if it can install apps that aren't in the app store)
- Look into making image capturing process automated
- Look into designing android app
- How to take periodic images
- How to communicate with camera using button or sensor
- Adjust shutter speed and/or ISO to accommodate different light levels. (automatic with flash disabled)

Sending

- Look into communication between android and linux
- Ways to store/send images
- Ways to make sending info reliable
- How to send data automatically
- How to recieve data on linux
- How to automate linux processes
- How to send to/connect to moodle folder.

Processing

- How to remove background noise
- How to stitch in information covered by professor
- How to change brightness/contrast
- Look into better ways of processing images

- Look into what image processing libraries are available
- Maybe look into what programs are available to do these sorts of things for us.
- Look into ways to automate actions performed by random programs
- Look into ways to do what we want with pre-made programs and just automate the processes somehow
- What sorts of processing technologies are available to us?

2 Identification of Risk

2.1 Technically Difficult

- Stitching of images
  Risk Level: High
- Identification of professor in images
  Risk Level: High
- Identification information on board
  Risk Level: High
- Automation of camera
  Risk Level: Medium
- Identification of key frames
  Risk Level: Medium

2.2 Time Consuming

- Large amounts of coding
  Risk Level: Low
- Understanding image processing APIs and libraries
  Risk Level: Low
- Automation of camera (repeat)
  Risk Level: Medium

2.3 Unknowns

- Automation of camera (repeat)
  Risk Level: Medium
- Capturing 100% of information on whiteboard
  Risk Level: Medium

3 Prioritize Risk

The following list organizes the risks identified in the previous section ordered by the risk level they pose to the project not meeting the specifications. Order is from high to low risk level.

1. Identification of professor in images
2. Identification of information on board

3. Stitching of images
4. Automation of camera
5. Identification of key frames
6. Capturing 100% of information on whiteboard
7. Large amounts of coding
8. Understanding image processing APIs and libraries

4 Deliverables

The following is a list of deliverables that demonstrate how the risks from above are mitigated.

4.1 Identification of professor in image

Demonstrate a program that can identify professor shaped and colored objects in front of a whiteboard. The planned approach for this is based on the Microsoft WCS's idea of breaking the board down into hundreds of cells and categorizing the cells as white, mostly white, or other. Any connection of 'other' cells constitute a professor.

4.2 Identification of information on board

Demonstration of a program that can identify areas of a whiteboard as information on blank space. The planned approach for this is based on the Microsoft WCS's idea of breaking the board down into hundreds of cells and categorizing each cell as white, mostly white, or other. Mostly white will constitute information.

4.3 Stitching of images

Demonstration of a program that can take two images and stitch them together so that the area blocked by the professor in one will be replaced with the information on the whiteboard on the other image.

4.4 Automation of camera

Demonstration that the capture device can be started, will capture images, store/send them somewhere, and be stopped. The planned approach for this is to program the camera to start capturing images at an interval of 5 seconds until it is stopped. The images will be sent wirelessly to the analysis system.

4.5 Identification of key frames

Demonstration of program that can identify when there is the maximum amount of information written on a whiteboard. The planned approach for this is to count the number of 'mostly white' cells in each frame and identifying key frames as frames where the number of 'mostly white' cells is a maximum.

4.6 Capturing 100% of information on whiteboard

Demonstration of a lecture simulation with the capture system started and showing that if a section of the board is uncovered for 5 seconds, the system will capture the information.

4.7 Large amounts of coding

Identification of versions on GitHub showing functioning systems where each version has more features/fewer bugs than the previous.

4.8 Understanding of image processing APIs and libraries

This will be verified through other demonstrations listed above.

5 Division of Tasks

Task	Members
Design algorithms for image processing	Colin, Griffin, Phil
Investigation into source code of CamScanner	Griffin
Investigation into Python image processing libraries	Colin, Phil
Maintaining work logs	Colin, Griffin, Phil
Implementation of image processing	Colin, Phil
Implementation of camera automation	Griffin, Phil