Week 6

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Problems Encountered

- Problem: OpenCV functions that accept a string as a parameter crash in C++.
- Solution: Revert back to C interface when this happens.
- Problem: The Minoru stereo camera I've been using has a low framerate and bad image quality.
- Solution: Use the better Bumblebee camera.
- Problem: The Bumblebee camera did come come with software for recording video.
- Problem: The Bumblebee camera does not work with OpenCV's video recording API.
- Solution: Write new video recording code using Point Grey's proprietary libraries.

Accomplishments

- Learned about SVMs, shape context, and boosting
- Found a bug in OpenCV (I think)
- Digested paper: "Action Snippets: How many frames does human action recognition require?"
- Collected a preliminary dataset (will be replaced with more comprehensive, better quality version)
- Explored a new stereo algorithm (semi-global block matching)
- Learned the Bumblebee API
- Wrote a program to record videos using the Bumblebee camera

Video Captured by Minoru Camera

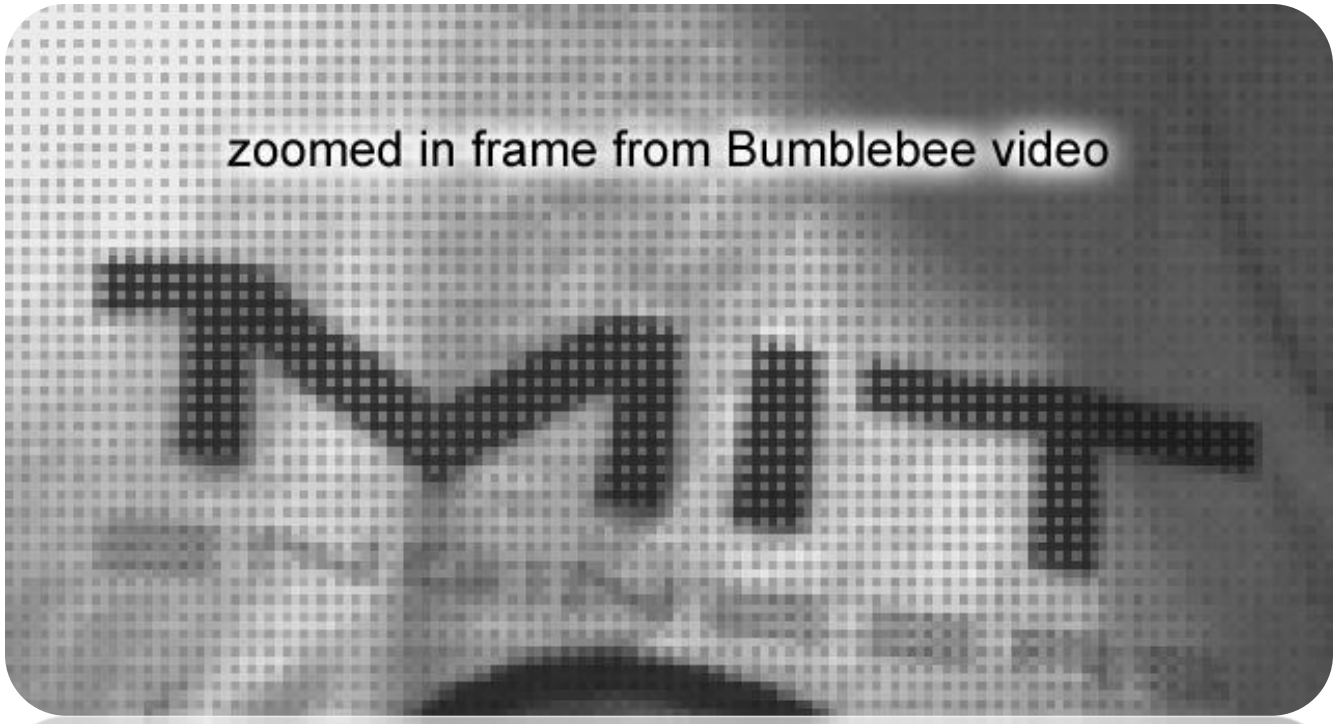
Video Captured By Bumblebee

The Bumblebee Camera

- This is the camera we will use for the dataset:

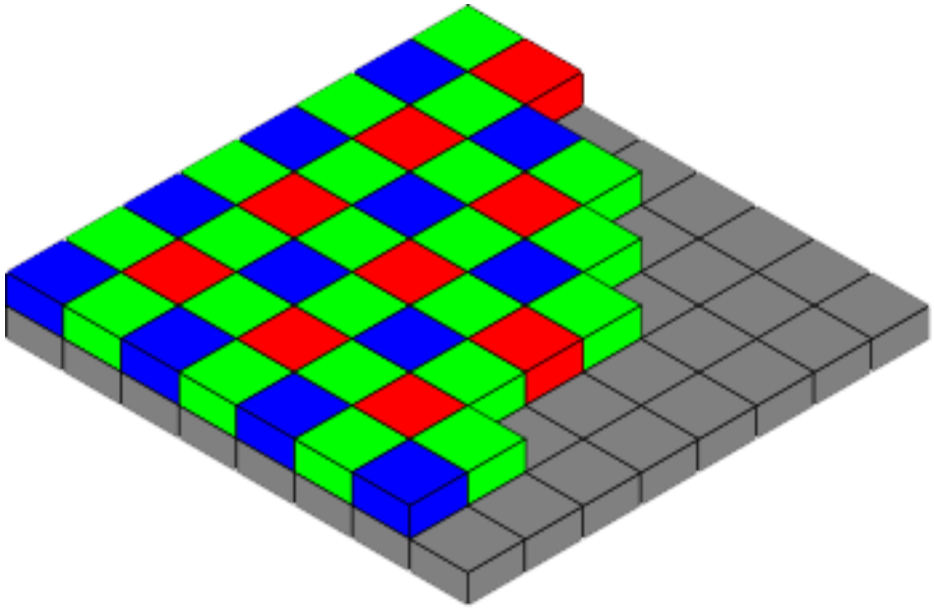
Bayer Filtering

- The problem with the Bumblebee:



Bayer Filtering

- This is how cameras record color.



Semi-Global Block Matching

- New stereo algorithm exposed in OpenCV 2.1 (but only for C++ users for some reason!)
- From the OpenCV website:

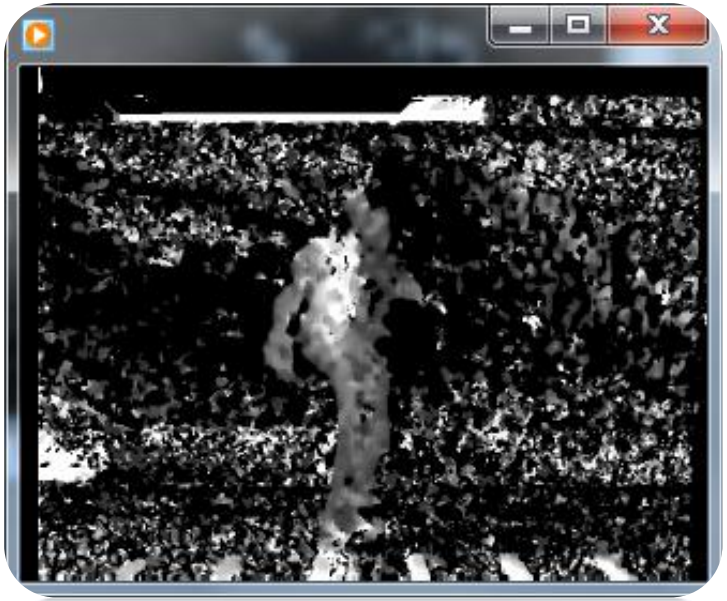
"The new algorithm produces noticeably cleaner disparity maps, comparing to block matching and at the same time the results are pretty much comparable, if not better sometimes, to the much slower graph-cut based algorithm."

- My conclusion so far: **False**.

Semi-Global Block Matching

Block Matching

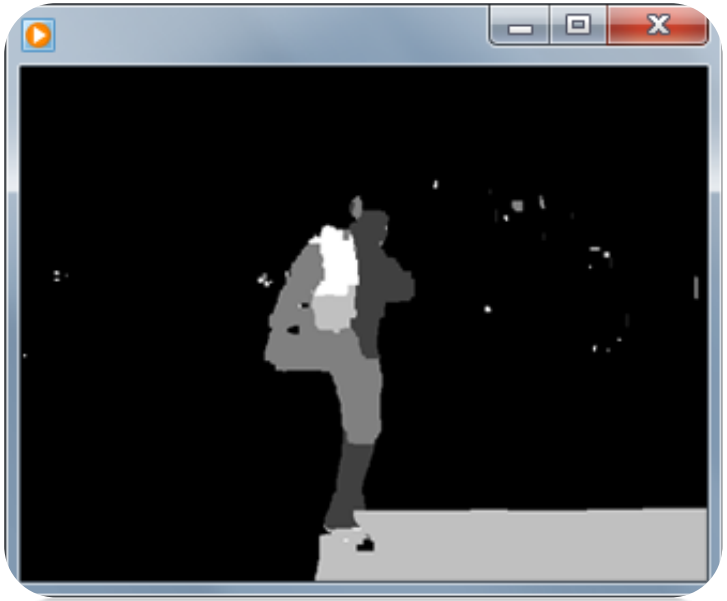
Semi-Global Block Matching



Semi-Global Block Matching

Block Matching

Graph-Cut



Conclusion

- The block matching algorithm outperforms the semi-global block matching and graph-cuts methods for these videos.
- The Bumblebee camera might yield different results for these algorithms. OpenCV claims that the graph-cuts method should produce the best results, then semi-global block matching, and finally regular block matching should be the worst. More on this to come!
- Final Note: Volunteer to be a part of the dataset!

Future Plans

- Find volunteers for new dataset
- Collect new dataset
- Do actual research
  - Start with action-recognition algorithm proposed in "Action Snippets: How many frames does human action recognition require?"
  - Incorporate depth information
  - Conduct experiments to see if depth allows us to recognize an action faster than just color info.