

Multidimensional Digital Signal Processing Project

Example Project Proposals

Due 05/09

Suggested project topics are:

- Kinect-based video processing
- Intel Perceptual Computing
- Face detection and recognition
- Emotion recognition
- Video stabilization
- Pedestrian detection/tracking
- Intersection safety assessment
- License plate recognition
- Object detection/recognition
- Vehicle detection

1. Kinect-based video processing
Use the Microsoft Kinect SDK to build gesture recognition and interaction systems.
<http://www.microsoft.com/en-us/kinectforwindows/>
2. Intel Perceptual Computing
Use Intel's Perceptual Computing SDK to develop close range human computer interaction (HCI) systems (e.g. controlling your laptop with Minority report styled hand gestures).
<http://software.intel.com/en-us/vcsourcetools/perceptual-computing-sdk>
3. Face detection and recognition
Real-time detection and recognition of faces in video.
OpenCV Object Detection
4. Emotion Recognition
Examine features of the face to understand the emotion of a person. Optionally, one could look at how tired a person is (PERCLOS) or driver distraction.
http://mplab.ucsd.edu/wordpress/?page_id=79
5. Video Stabilization
Estimate the background motion in a video to compensate for camera motion.
<http://googleresearch.blogspot.com/2012/05/video-stabilization-on-youtube.html>
6. Pedestrian Detection
Dalal and Triggs histogram of oriented gradients for detection of people.
<http://pascal.inrialpes.fr/soft/olt/>
7. Intersection Safety Assessment
Examine vehicle/pedestrian movements at intersections to score the intersection safety (can be based on number of illegal maneuvers, how often pedestrians and vehicles are in conflict, number of red lights run, etc.).
<http://n.saunier.free.fr/saunier/#resources>
8. License Plate Recognition (LPR)
Detect license plate regions of cars and read the number.
<http://www.licenseplaterecognition.com/>

9. Object Detection and Recognition
Be able to detect and recognize a wide variety of objects. This project will utilize a number of public datasets such as VOC and Caltech 101.
<http://pascallin.ecs.soton.ac.uk/challenges/VOC/>
10. Vehicle Detection
Detect surrounding vehicles from a car mounted camera. Camera may be facing forward to detect rear of lead vehicles (and optionally do lane detection), to the rear for front vehicle detection, or to the sides for profile detection.
http://cvrr.ucsd.edu/publications/2011/sivaraman_mva_2011.pdf
11. Mobile Image/Video Processing
Use the camera on a smart phone for onboard processing. For example, image-based barcode scanner.
12. Unsupervised Motion Analysis with Latent Topic Models
Use techniques from web document and search techniques to characterize scene motion.
<http://www.ee.cuhk.edu.hk/~xgwang/papers/topicmodel.pdf>
13. Panoramic Stitching
Automatically build panoramas using multiple images. Sample images can be provided from high altitude balloon launch.
14. Vehicle Make and Model Recognition
Match cars based on make and model rather than using license plate technology.
http://research.wstkt.pl/?page_id=2