Computer Vision Systems Programming UE

Introduction

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Course Topics

Motivation

- Computer Vision (CV) knowledge is important
- As is to be able to **put this knowledge to use**

This course encourages you to

- Explore a CV topic of your choice
- Get used to software packages and libraries
- Improve your CV programming skills

Your Task

Select, implement, and present a CV project of your choice

- In any programming language you like
- Using any **publicly available** libraries you want
- As long as the required effort is appropriate

Matlab, Python, or C++ recommended

Project Topics

Choose any CV topic you want, as long as you learn something

- Choose something that is new and interesting to you
- Finalize topic and scope in consultation with lecturers

Don't know what topic to choose? How about these ...

Project Topics
Proposal – Balloon Tracking

Involve concert audience by letting them control sound aspects

Accomplished by moving a balloon above their heads

Project Topics
Proposal – Balloon Tracking

Task: detect and track the balloon in 3D

- Camera parameters and balloon size are known
- Pose estimation problem

Extensions

- Detect balloon color
- Track multiple balloons simultaneously

`http://www.caa.tuwien.ac.at/cvl/teaching/praktika/ballonerkennung/`

Project Topics

Proposal – Meal Composition Recognition

Unhealthy nutrition is a problem in our society

Often there is little knowledge of the composition of meals

Image by Vichaya Kiatying-Angsulee / freedigitalphotos.net

Project Topics
Proposal – Meal Composition Recognition

Task: estimate share of carbs, proteins, vegetables in meals

- From photos taken with smartphone cameras

`http://www.caa.tuwien.ac.at/cvl/teaching/praktika/food/`

Project Topics

Proposal – Sitting Posture Recognition

Bad sitting posture can cause health problems

Task: recognize good or bad posture using a Kinect sensor

Image from yogahome.net

Project Topics
Proposal – Kinect v2 Evaluation

Evaluate the Kinect v2 sensor

Image from microsoftstore.com

Project Topics

Send a short project proposal to lecturers (`cvsp@caa.tuwien.ac.at`)

- What topic do you want to cover
- What is the scope (what are you going to implement?)
- What language and libraries do you plan to use

Do so as soon as possible (**deadline: 26.10.**)

Syllabus

1. Select a CV topic according to your interests
   - Lecturers will help you define topic and scope
2. Give a short presentation on your topic (5 minutes)
   - Explain what you are going to work on
3. Implement and test your application
   - Sensor hardware is provided
4. Write a short report (around 5 pages)
5. Give a final presentation (10-15 minutes)

Syllabus

Available Sensor Hardware

Available sensors

- Kinect depth sensors
- IP camera network with overlapping views (stationary)
- Thermal imaging camera (stationary)
- Android tablets with cameras

Or use your own digital camera, smartphone, ...

Syllabus

Short report and Final Presentation

Report and presentation should include

- A brief explanation of your topic
- How you implemented it (language, libraries)
- Problems you faced during development
- Tests and results

Course Location and Schedule

There are no regular lectures but two presentation meetings

Location: Seminarraum 183/2, Favoritenstr. 9
Time: Wed 10:15 – 11:45 s.t.

Schedule: `http://www.caa.tuwien.ac.at/cvl/teaching/wintersemester/cvsp_lu/index.html`

Course Assistance

Assistance mainly via mail (`cvsp@caa.tuwien.ac.at`)

Weekly timeslot for personal support

- **By appointment** (`cvsp@caa.tuwien.ac.at`)
- **Time**: Wed 11:45 – 12:30 s.t. (after VO)
- **Location**: room HA04-10

  `http://www.caa.tuwien.ac.at/cvl/contact/floorplan.html`

We expect to stay in touch with you throughout the semester

Course Assistance

I'm abroad from 11.10. to 25.10. with limited internet access

Prerequisites

You must be able to develop software on your own

- This is **not** a general programming course

Basic image processing and computer vision knowledge

Grading

Initial presentation: 5%
Implementation and report: 80%
Final presentation: 15%

Presentations are mandatory!

Associated Lecture

We recommend the associated lecture that covers

- CV software and resources
- Selected CV applications