Computer Vision Systems Programming UE

Introduction

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Course Aim

Improve your skills in applied Computer Vision (CV)

- ▶ Plan, implement, and test a small CV project
- ▶ Present it orally and in written form

This allows you to

- ▶ Explore a CV topic of your choice
- ▶ Apply what you learned in the lecture
- ▶ Improve your CV programming skills
- ▶ Practice dissemination

Your Task

Realize 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

- ▶ Don't know C++ yet? Now is a good time!

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 together with lecturers

Available sensors

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

Or use existing datasets, your own camera, smartphone, ...

Detect and track the balloon in 3D

Project Topics
Proposal – Object Detection in Satellite Images

Detect streets and certain objects in satellite images
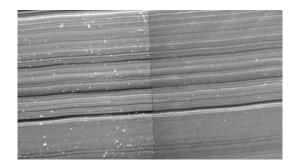

Image from Sirmacek and Unsalan 2009

Distinguish between moth species

Image from wikipedia.org

Match traces left by burglary tools for forensics

For more topics and details see `http://www.caa.tuwien.ac.at/cvl/`
`bachelorarbeiten-praktika-masterarbeiten/`

Face detection and pose estimation to map beards on faces

Image from wurstify.me

Syllabus

1. Select a CV topic according to your interests **[21.10.]**

2. Give a short presentation on your project **[28.10.]**

3. Implement and test your application **[17.01.]**

4. Give a midterm presentation **[9.12.]**

5. Write a short report **[17.01.]**

6. Give a final presentation **[20.01.]**

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

Contents

- Name, Matrikelnummer, Studienkennzahl
- General introduction to your topic
- Definition of the project scope (what are you going to do?)
- Languages and libraries you plan to use

Deadline: 21.10.

Give an introduction to your project

Tell us about your project (as in written proposal)

Keep it short (around 5 minutes)

28.10., 10:15 at SR 183/2 (here)

Briefly recap your project

Focus on progress and current project status

Presentation should take 5 to 10 minutes

Include images and videos of your application

9.12., 10:15 at SR 183/2 (here)

5 to 10 pages long, must include

- ▶ A brief explanation of your topic
- ▶ Scope of your project (what was planned, what changed?)
- ▶ How you implemented it (language, libraries)
- ▶ Problems you faced during development
- ▶ Tests and results

Hand in report and project code by email **until 17.01.**

Cover all topics in your report (see above list)

Presentation should take 10 to 15 minutes

Show a demo of your project (live or video)

20.01., 10:15 at SR 183/2 (here)

Grading

Initial presentation: 5%

Midterm presentation: 5%

Implementation and report: 80%

Final presentation: 10%

Presentations are mandatory

- ▶ Contact us beforehand if you cannot come

Course Assistance

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

Weekly timeslot for personal support

- ▶ On appointment (`cvsp@caa.tuwien.ac.at`)
- ▶ Wed 11:45 – 12:30 (after lecture)
- ▶ Room HA04-10 (`http://www.caa.tuwien.ac.at/cvl/contact/`)

We expect to stay in touch with you throughout the semester

- ▶ Contact us if you have questions, problems

Follow `@tuwcvsp` on Twitter for updates

Prerequisites

Ability to work independently, manage a small project

Basic image processing and computer vision knowledge

You must be able to develop software on your own

- ▶ This is *not* a general programming course

Associated Lecture

We recommend the associated lecture for

- ▶ CV software and resources
- ▶ Tips for approaching CV problems
- ▶ A showcase of interesting CV applications

Bibliography

Sirmacek, B. and C. Unsalan (2009). *Urban-Area and Building Detection Using SIFT Keypoints and Graph Theory*. IEEE Transactions on Geoscience and Remote Sensing.