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

Project Topics
Available Sensor Hardware

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, ...

Project Topics
Proposal – Balloon Tracking

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

Project Topics
Proposal – Moth Classification

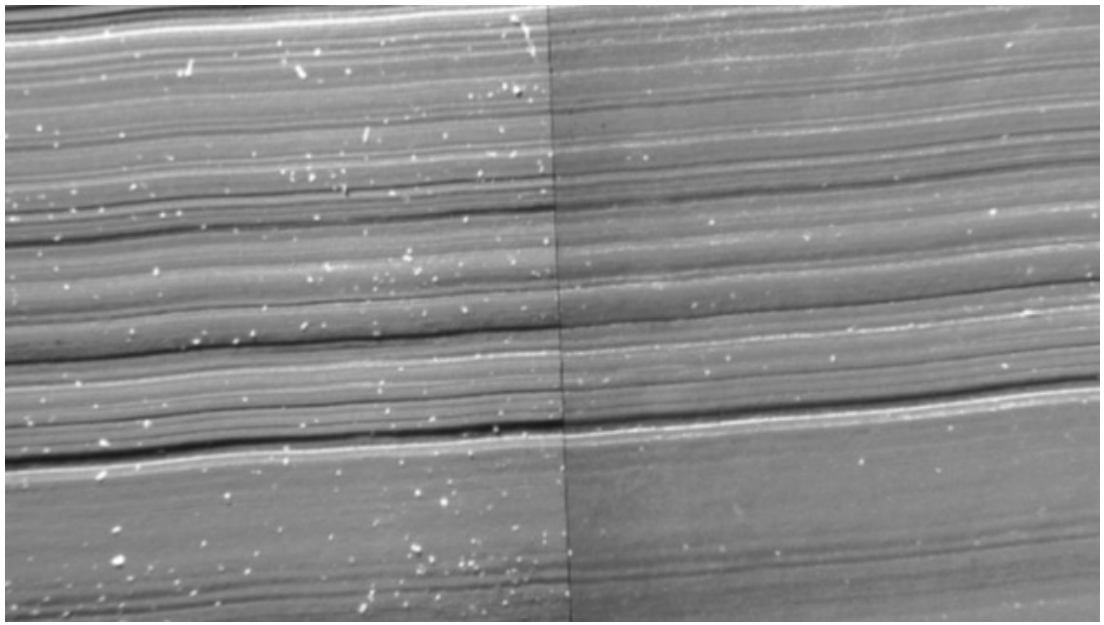
Distinguish between moth species

Image from wikipedia.org

Project Topics

Proposal – Match Traces Left by Burglars

Match traces left by burglary tools for forensics



Project Topics
More Proposals

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

Project Topics

Wurstify: Example Project From Last Year

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 **[16.12.]**
5. Write a short report **[17.01.]**
6. Give a final presentation **[20.01.]**

Syllabus
Topic Selection

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.

Syllabus

Initial Presentation

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)

Syllabus

Midterm Presentation

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

16.12., 10:15 at SR 183/2 (here)

Syllabus
Project Report

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.**

Syllabus
Final Presentation

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.