



Computer Vision 1

HC7b

CV2 Outlook Course Wrap-up, Exam Q&A

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Week 7 - Guest Lectures



dr. Vincent Leroy
Research Scientist
Naver Labs Europe

Tuesday



dr. Sezer Karaoglu
3DUniversum
Co-Founder & CTO

Tuesday



dr. Javier Romero
Research Scientist
Meta Reality Labs

Thursday

Very easy questions from each of the speakers talk will be in the exam, each lecture worth 1 pt

Schedule

| Week | Lecture | Date | Lectures |
|------|---------|--------|--|
| 1 | HC1a | 02 Sep | Introduction and Camera Geometry |
| | HC1b | 04 Sep | Camera Model and Image Formation |
| 2 | HC2a | 09 Sep | In-Place Processing & Photometric Stereo |
| | HC2b | 11 Sep | Neighborhood Processing & Image Filtering |
| 3 | HC3a | 16 Sep | Local Feature, Edge, Line and Corner |
| | HC3b | 18 Sep | Optical Flow, Motion and Tracking |
| 4 | HC4a | 23 Sep | Global Transform and Image Stitching |
| | HC4b | 25 Sep | Object Recognition |
| 5 | HC5a | 30 Sep | Retrieval, Detection and Segmentation |
| | HC5b | 02 Oct | CNNs, Object Detection Basics |
| 6 | HC6a | 07 Oct | Single Shot Detection, Network Architectures |
| | HC6b | 09 Oct | Shape from X, Stereo, Structure from Motion |
| 7 | HC7a | 14 Oct | Guest lectures |
| | HC7b | 16 Oct | Guest lecture & exam recap |

Today

(post exam) → Fri 27 Oct: **Lab5 ddl** – Img Classification

Outlook on Computer Vision 2

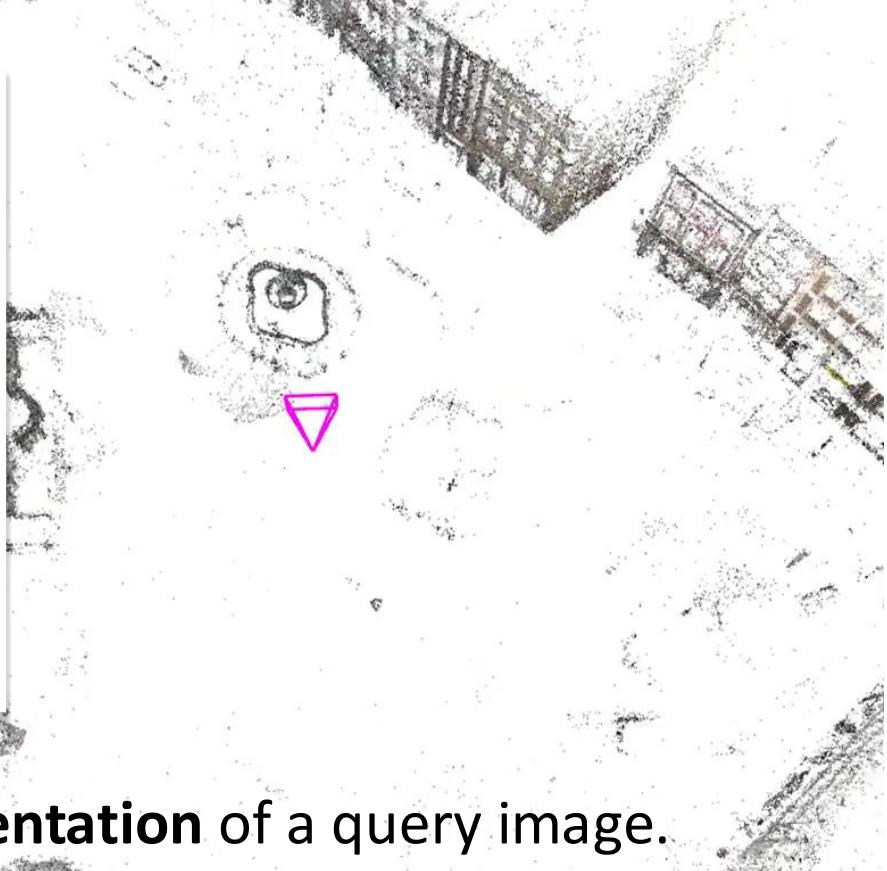
Spring (April-May) 2026: Semester 2, period 5

Structure-from-Motion (SfM)

Rome dataset

74,394 images

Image-based Localization



Compute **exact position and orientation** of a query image.

Mixed Reality: Navigation



Google maps AR [<https://edition.cnn.com/2019/02/11/tech/google-maps-ar/index.html>]

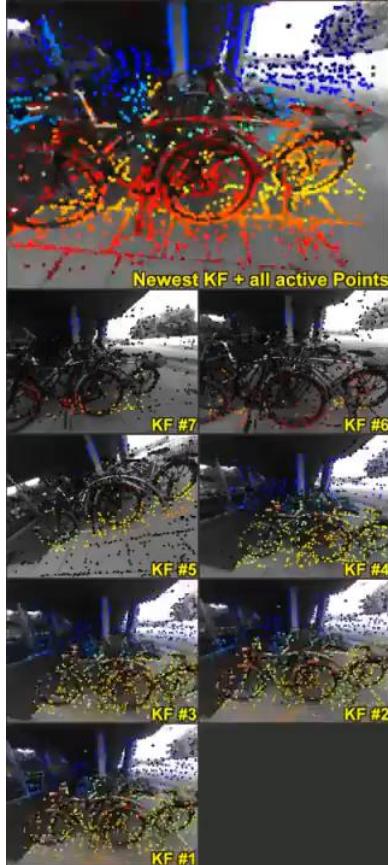


Google visual positioning system (VPS)
[<https://ai.googleblog.com/2019/02/using-global-localization-to-improve.html>]

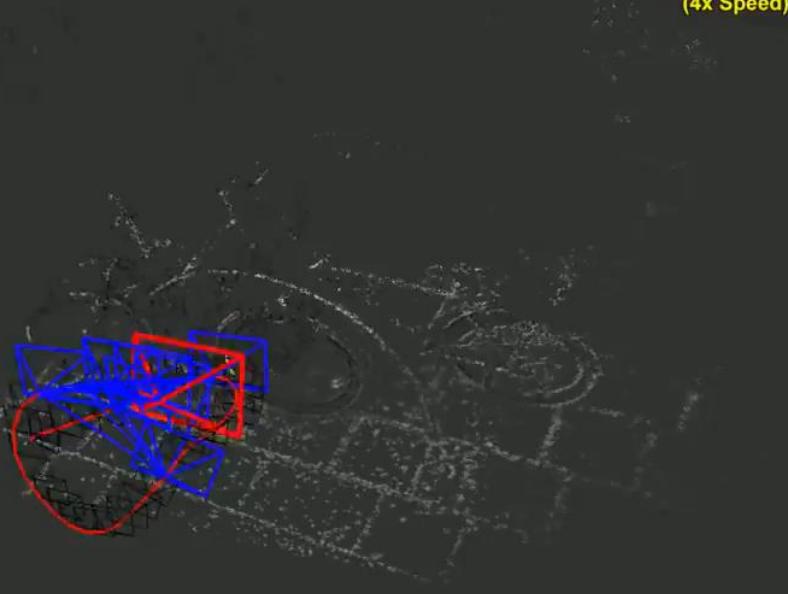
Dense Urban Reconstruction



Direct Sparse Odometry



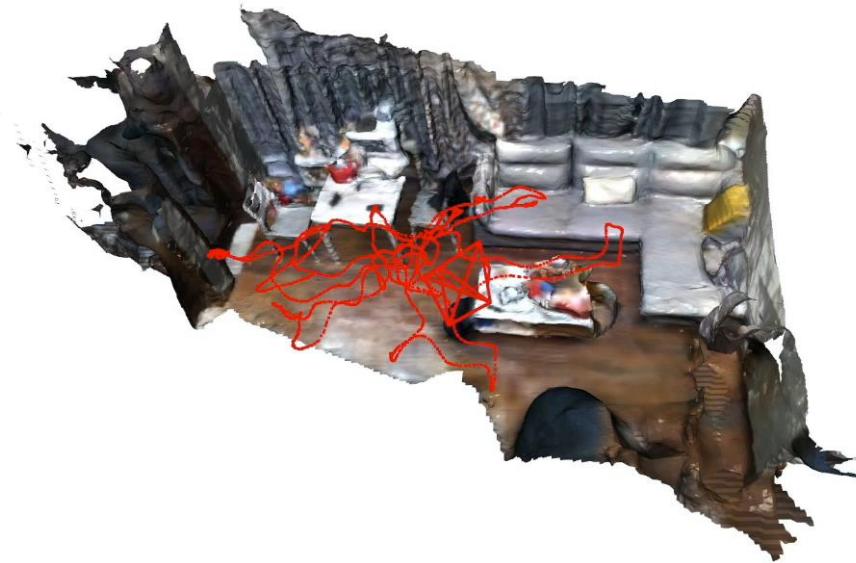
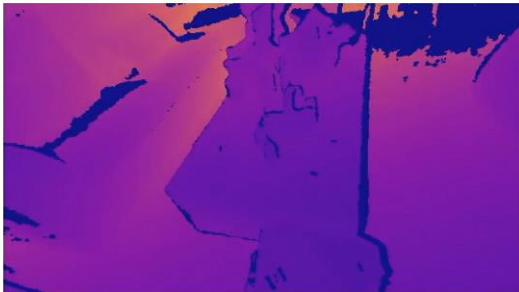
TUM monoVO Dataset
sequence_42
(4x Speed)



We propose a novel Direct and Sparse formulation for Structure from Motion,
which we implement as monocular Visual Odometry (DSO).

Dense SLAM

RGB-D Sequences



Mixed Reality: 3D Video Conferencing



Microsoft HoloPortation, 2016

[<https://www.microsoft.com/en-us/research/project/holoportation-3/>]



Facebook Reality Labs - Lombardi et al., TOG 2018

[<https://www.youtube.com/watch?v=gpdX9jkhv2U>]

Google Beam (aka Project Starline)



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Google Beam (aka Project Starline)



Mixed Reality: (Remote) Training & Assistance



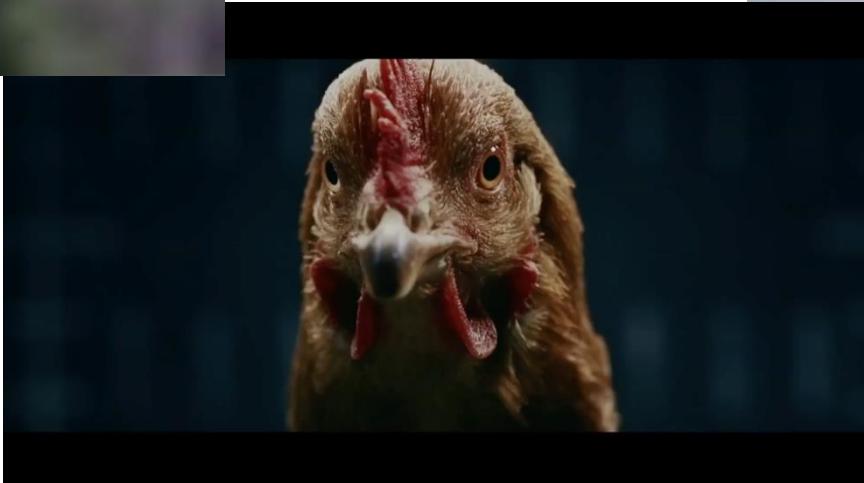
Autonomous Driving



Optical Stabilization



[Ed Ricker, Wind Hover Test, <https://www.youtube.com/watch?v=nriY21MnxI>]



[Mercedes-Benz commercial, <https://www.youtube.com/watch?v=nIwML2PagbY>]

Neural Radiance Fields (NeRFs)

Elapsed training time: 1 seconds



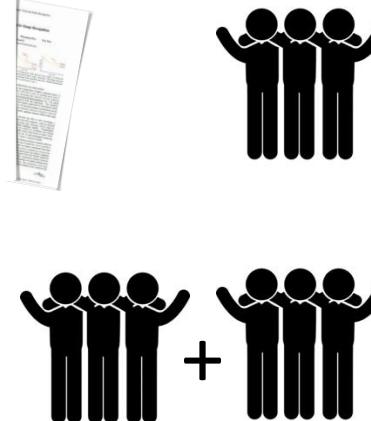
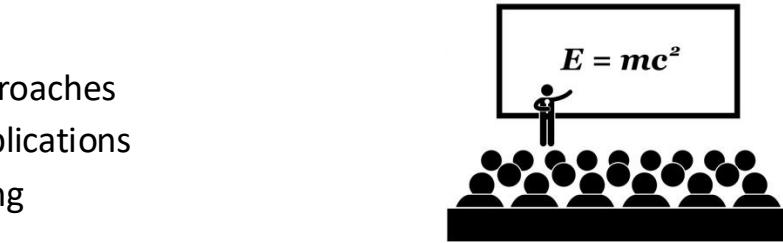
Language Embedded Radiance Field (LERF)

CVN

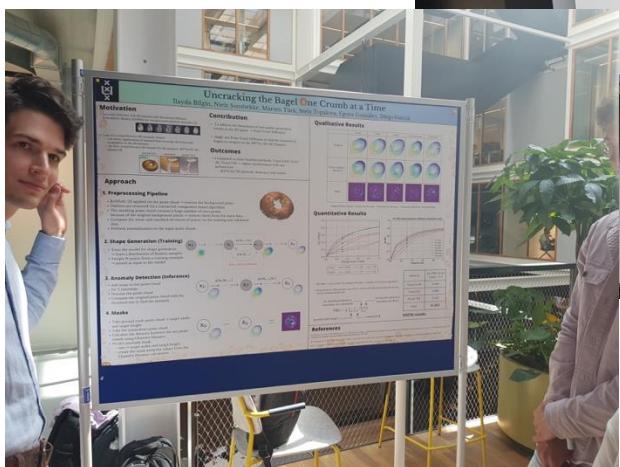
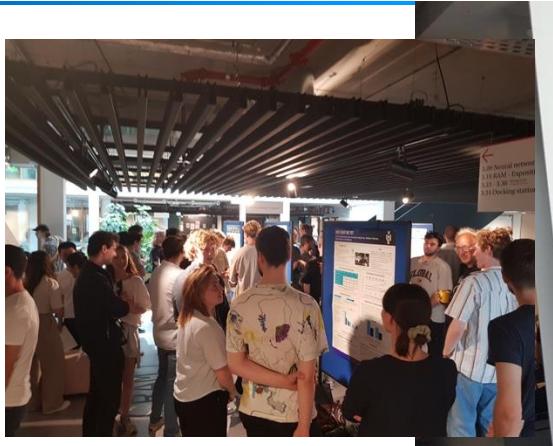


Learning Approach

- Lectures
 - Cover fundamental 3D computer vision concepts and approaches
 - Mix of Mathematical foundations and state-of-the-art applications
 - Focus on higher-level principle concepts and understanding
- Presentations / symposium of Research Papers (Group of 2-3 people)
 - Fundamental and influential computer vision papers
 - Read the papers
 - Submit 3 questions
 - One Presentation (30 min. + 5 min. Q&A)
- Project (Group of 4-6 people = two presentation groups)
 - Design and Implementation to solve a real-world computer vision problem
 - Work on recent algorithms within a group
 - Hands-on experience



Great Project Results – Poster Session



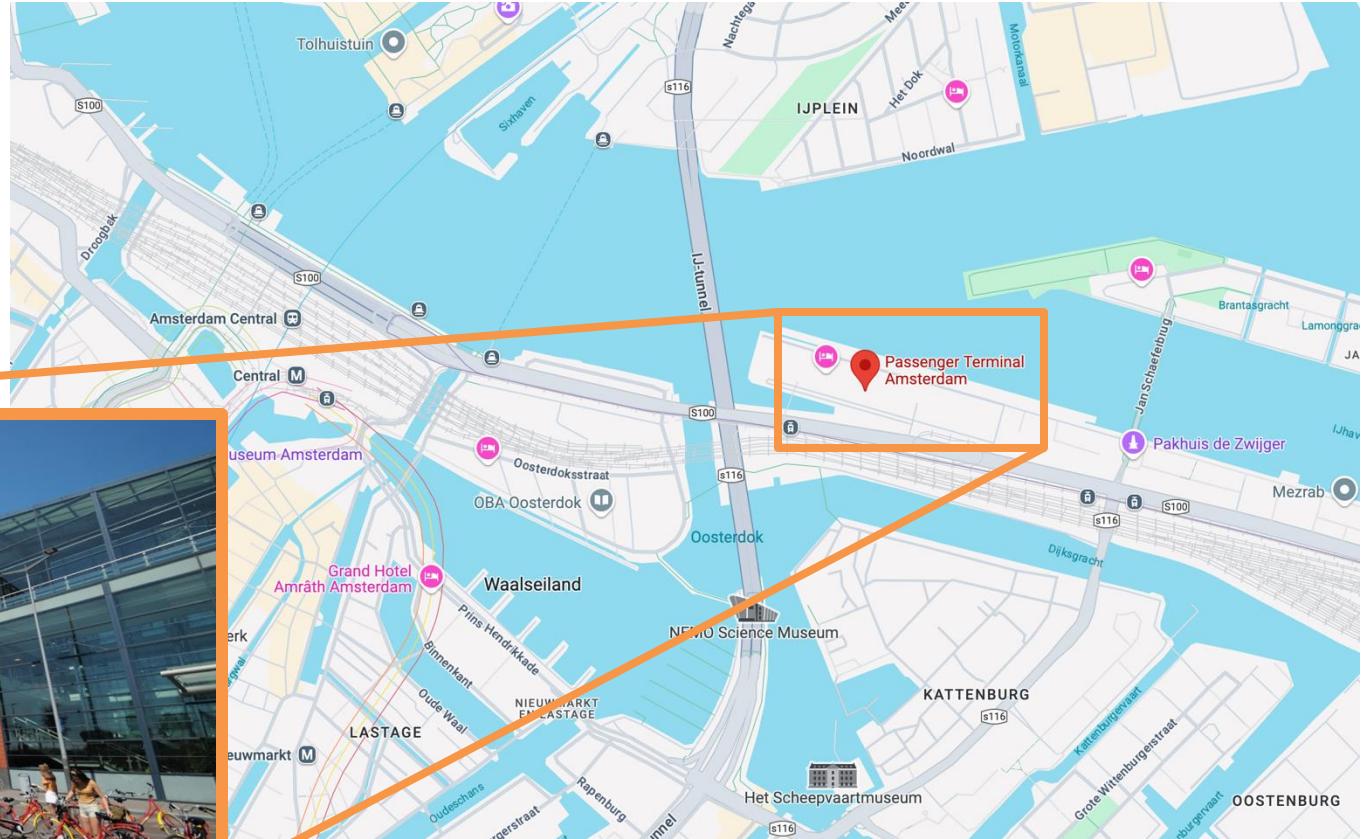
Final Exam

- Time: Tuesday, October 21, 2025, 9-12am [+extensions]
- Location: Tentamenzaal, **Passenger Terminal Amsterdam**
- Please **arrive** at least **15min before** the exam starts



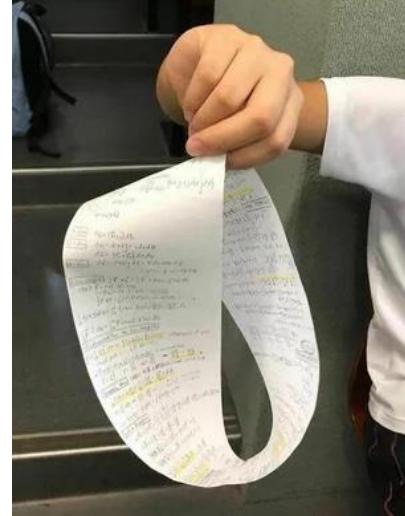
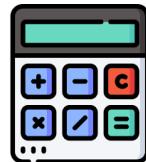
Final Exam

- Tram 26 stop:
Muziekgebouw
Bimhuis



Final Exam – What to bring

- Student ID (put on table)
- Watch (or table clock)
- Calculator
- Pens, pencils and eraser
- One A4 cheat-sheet of handwritten memo (both sides are OK)
- Bottle of water
- *Food is allowed only if it does not generate noise or smell



Final Exam – Rules

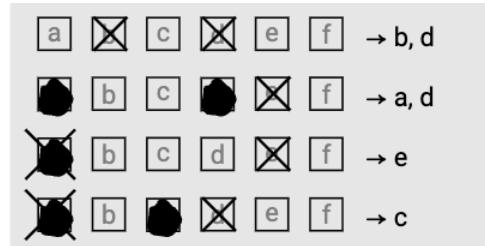
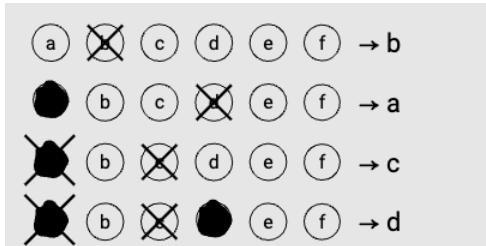
1. Late arrival and early leave. If you come late, you can still take the exam if you arrive within one hour of the start. After that you are not allowed to enter. You will get **no extension for late arrival**.
2. As usual bring your **student ID** card for identification and **writing material** (pencil, eraser).
3. You are allowed to bring with you a **simple calculator** and one **A4 sheet with handwritten notes**. Extra empty papers will be provided by us, so please don't bring any.
4. Switch off your phone or any communication devices. It will be considered cheating if we see you using it. Apart from the simple calculator **no use of electronic devices is allowed** (phones, smartwatches, earphones, etc.) – use regular earplugs if desired.
5. Short breaks are allowed for eating and/or using the toilet. Please signal the a supervisor to get permission to do so. You can drink water during the exam. Please be quite and do not disturb your fellow students.

Final Exam – Rules and Tips

- First check your exam for completeness. Read all instructions.
- Fill first page:
 1. enter your name first (top-left of this page), then
 2. (2) write your study number in the boxes above the matrix (top-right of this page), and finally
 3. (3) cross the corresponding figures. In case of error, call us immediately to replace the exam.
- **Answers:** Reply in English. Please strive for clean handwriting, else grading might slow down.
- Asking help from supervisors: Code for assistance to avoid running back and forth:
 - **1 finger:** a substantive question about a task
 - **2 fingers:** a sticker needed
 - **3 fingers:** extra draft paper
 - **Whole hand:** request for WC (you might have to wait in case of multiple requests)
- **Stay within the framework for answers** as much as possible. Work out tricky questions on a draft first. But we can tape off with white 'stickers' if you need more space.
- **DO NOT TAPE OFF ANS INFORMATION!!!!** (i.e. the 4 barcodes and any IDs).
- At the end, **double-check all answers**, & ensure that multiple-choice questions have clear answers!
- You **cannot** take scratch paper or take & distribute exam copies in any form (physical or digital).

Final Exam – Rules and Tips

- Read the questions carefully!
- Use your time wisely, there are easy questions, normal questions and challenging questions. Do easy ones first, return to harder ones later.
- Don't forget to write down your names and student number on the cover page. All other pages are identified with a QR-code (do not alter!)
- **Multiple choice question corrections: pencil->rubber / cross->fill / sticker**



Fill in your answer(s) to the multiple-choice questions as shown above
(circles = **one** correct answer, boxes = **multiple** correct answers possible).

Final Exam – Difficulty

- Mix of multiple choice questions, text answers, calculations
- Mix of easy, medium and difficult questions
- Similar to previous years: only content from the lectures & exercises.
- Detail level: in accordance to lectures & exercises
Last years exam gives a good overview



Lecture Evaluation

- You will give a paper evaluation form along with the exam sheet.

Filling the form is not mandatory, but encouraged.



After the exam

- We will aim to finalize the grading of the exam within 2-3 weeks.
- You will find the grading details on ANS
- After the release of the grading, the students can request verifying the grade within 1 week. We will announce how to do that later.
- After the verifying period, the grading will be finalized.
- **Resit in January 7, 2025** - hopefully not needed 🤞



Final Exam



Questions?