Seminar Vision Systems MA-INF 4208

11.07.2025

PROF. SVEN BEHNKE, ANGEL VILLAR-CORRALES

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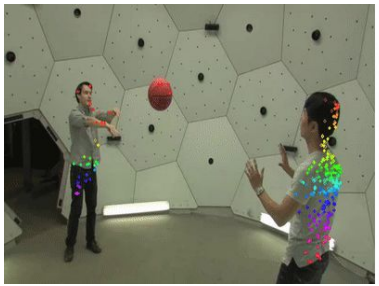
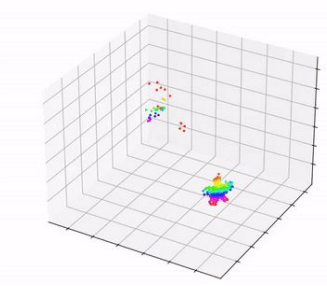
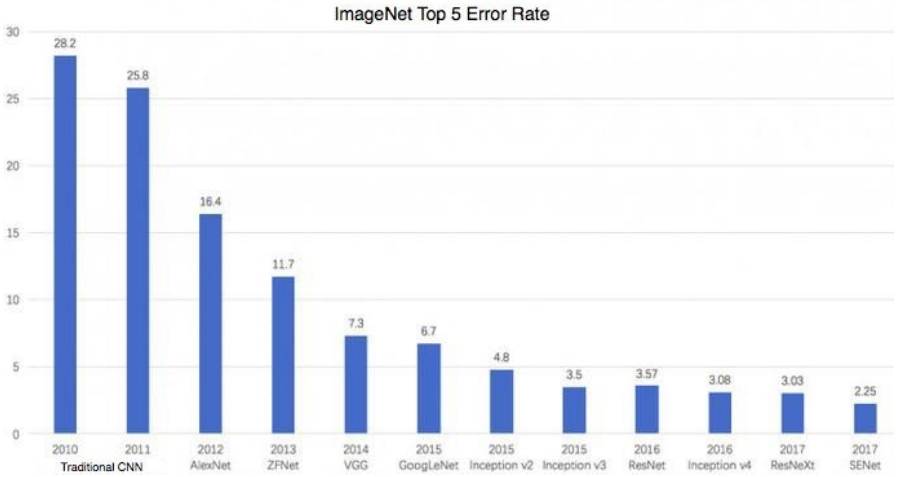
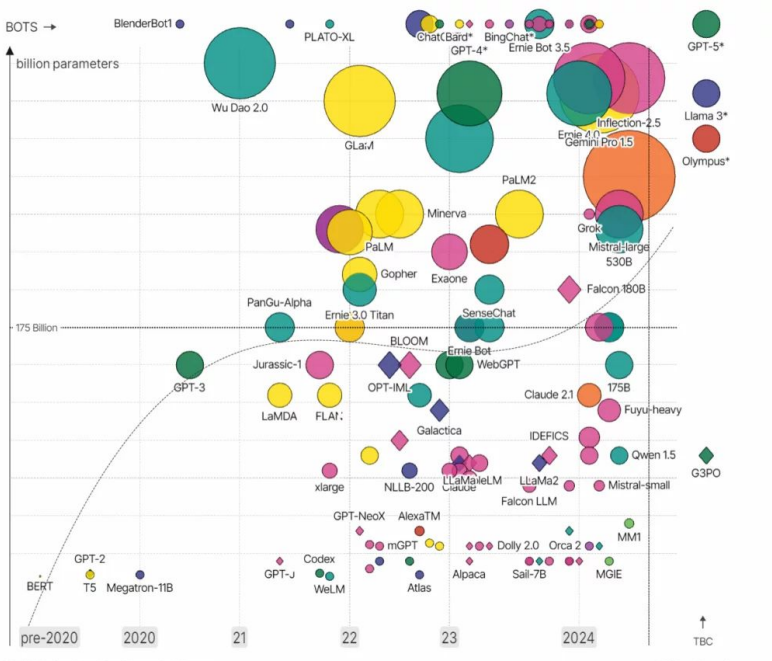
The Age of Deep Learning





The Age of Deep Learning

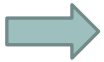




The Age of Deep Learning

In this seminar...

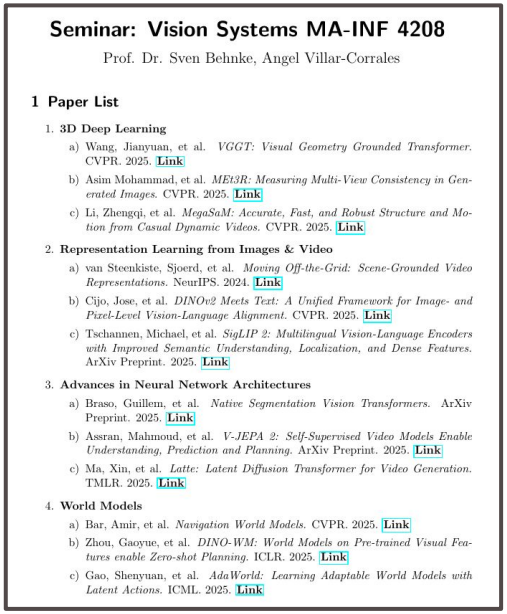
- Acquire/improve ability to:
  - deal with scientific publications (e.g. papers)
  - write a scientific report
  - present a scientific topic to an audience
  - engage technical topics



Important skills for Master Thesis!

In this seminar

- Discuss trending topics in deep learning and computer vision
- We will cover the following topics
  - 3D Deep Learning
  - Representation Learning from Images & Video
  - Advances in Neural Network Architectures
  - World Models



Seminar: Vision Systems MA-INF 4208

Prof. Dr. Sven Behnke, Angel Villar-Corrales

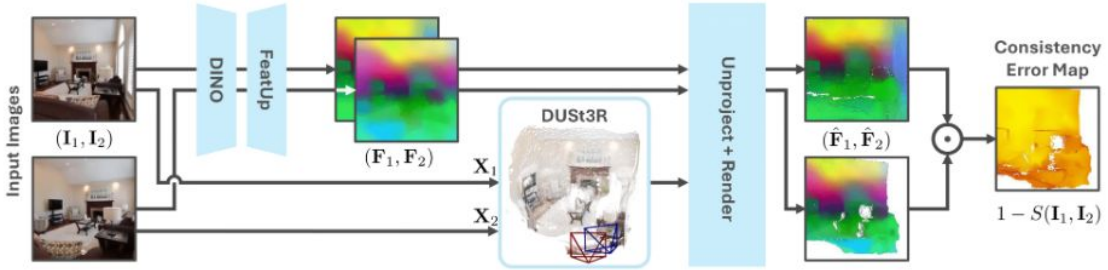
1 Paper List

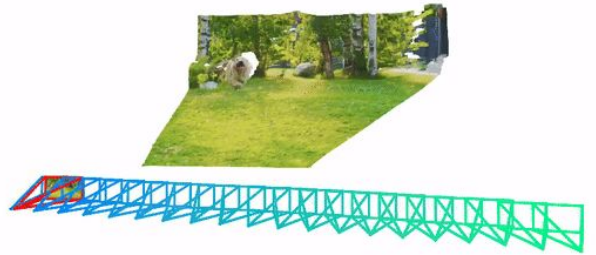
1. **3D Deep Learning**
   a) Wang, Jianyuan, et al. *VGGT: Visual Geometry Grounded Transformer.* CVPR. 2025. Link
   b) Asim Mohammad, et al. *MEt3R: Measuring Multi-View Consistency in Generated Images.* CVPR. 2025. Link
   c) Li, Zhengqi, et al. *MegaSaM: Accurate, Fast, and Robust Structure and Motion from Casual Dynamic Videos.* CVPR. 2025. Link
2. **Representation Learning from Images & Video**
   a) van Steenkiste, Sjoerd, et al. *Moving Off-the-Grid: Scene-Grounded Video Representations.* NeurIPS. 2024. Link
   b) Cijo, Jose, et al. *DINOv2 Meets Text: A Unified Framework for Image- and Pixel-Level Vision-Language Alignment.* CVPR. 2025. Link
   c) Tschannen, Michael, et al. *SigLIP 2: Multilingual Vision-Language Encoders with Improved Semantic Understanding, Localization, and Dense Features.* ArXiv Preprint. 2025. Link
3. **Advances in Neural Network Architectures**
   a) Braso, Guillem, et al. *Native Segmentation Vision Transformers.* ArXiv Preprint. 2025. Link
   b) Assran, Mahmoud, et al. *V-JEPA 2: Self-Supervised Video Models Enable Understanding, Prediction and Planning.* ArXiv Preprint. 2025. Link
   c) Ma, Xin, et al. *Latte: Latent Diffusion Transformer for Video Generation.* TMLR. 2025. Link
4. **World Models**
   a) Bar, Amir, et al. *Navigation World Models.* CVPR. 2025. Link
   b) Zhou, Gaoyue, et al. *DINO-WM: World Models on Pre-trained Visual Features enable Zero-shot Planning.* ICLR. 2025. Link
   c) Gao, Shenyuan, et al. *AdaWorld: Learning Adaptable World Models with Latent Actions.* ICML. 2025. Link

Paper List: https://www.ais.uni-bonn.de/SS/SeminarVision/PaperList.pdf

3D Deep Learning

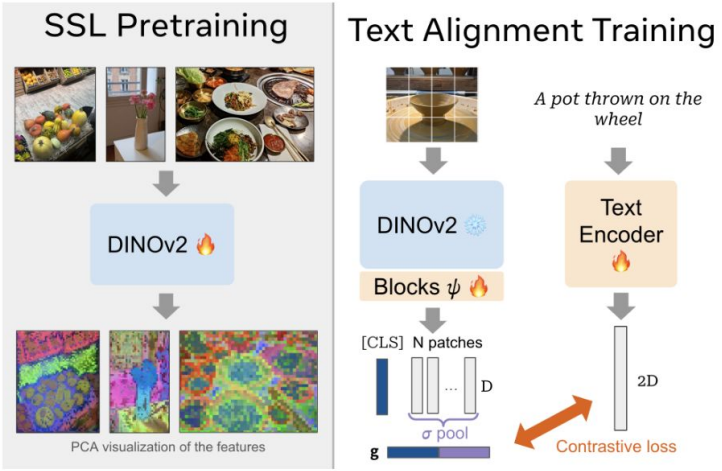
- Learning 3D-aware representations of a scene given a set of posed images
- Applications such as:
  - Novel View Synthesis
  - Evaluating 3D consistency
  - Structure-from-Motion





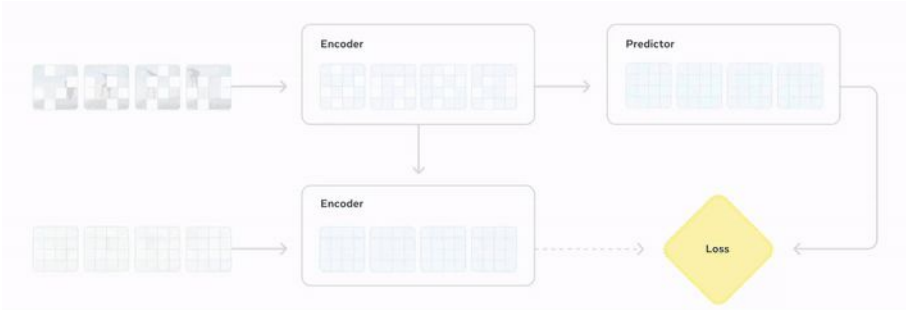
Representation Learning from Images & Video

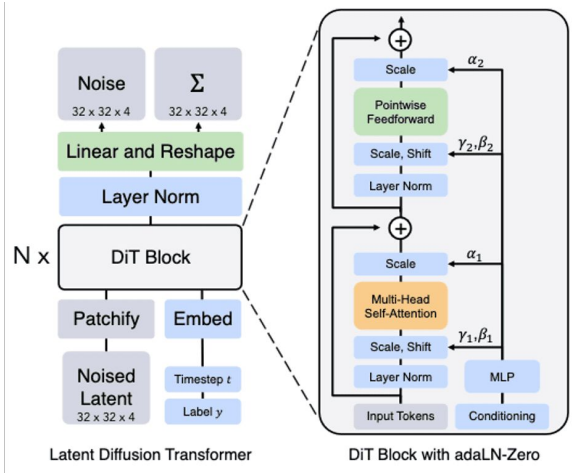
- Learning representations from video data without annotations
- Applications such as:
  - Representation learning
  - Image-Language Grounding



Advances in Neural Network Architectures

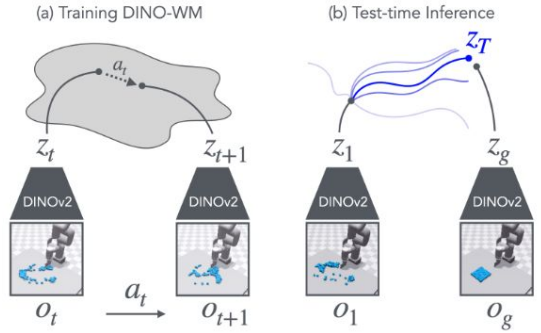
- Novel neural network architectures
  - Image segmentation with transformers
  - Self-supervised learning
  - Diffusion Transformers

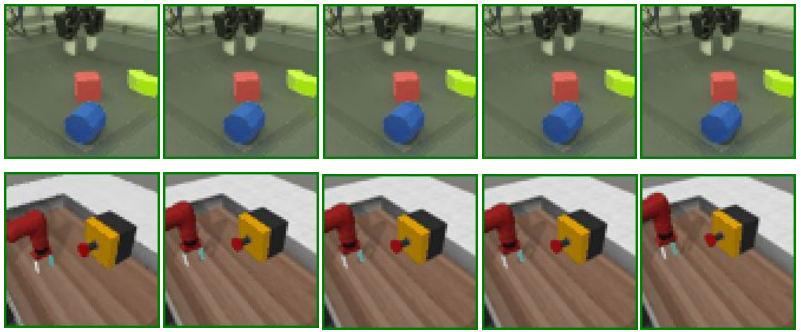




World Models

- Models that learn to simulate environments and predict future possible outcomes
- Applications such as:
  - Navigation
  - Planning
  - Controllable video generation





Get a Spot and Select your Topic

- Fill the following **form** no later than 14.07.2025
  - Your name & email
  - Matriculation number
  - Your three preferred papers
- Based on this form, I will and assign seminar spots and papers to review on Monday 18.07.2025
- Upon my confirmation:
  - Register in BASIS
  - Start working on your paper

BASIS Registration opened until 07.08.2025!

Deliverables (preliminary dates)

- **Presentation**: Thursday 25.09.2025
  - 30 min presentation
  - 15 min discussion

- **Report**: Thursday 02.10.2025 (will be one week after presentations)
  - LaTeX template
  - 8-12 pages
  - Brief but readable and informative
  - BibTex citations

⇨ Arrange a meeting with me ≈1 week before the presentation to check the preliminary materials for the presentation and report.

Report

- Well structured:
  - Abstract
  - Introduction, methods, results, conclusion, ...
  - Tables and figures
  - Correct citations

- Your own scientific opinion:
  - What are the weak points of the paper?
  - What is missing?
  - Are comparisons fair and believable?
  - Possible future steps?

We don’t want a copy of the paper!

Grading

- 66.7%: Presentation
  - Quality of the presentation slides
  - Presentation skills
  - Ability to answer questions

- 33.3%: Report
  - Overall quality of the report
  - Critical thinking and own discussion
  - Understanding of the concept

Seminar Alternative

Seminar Cognitive Robotics: [Link]

- Same seminar format
- Papers more robotics related:
  - Grasping and Manipulation
  - **Robot vision & perception**
  - SLAM
  - Planning and Navigation

➢ Introductory meeting on **25.07.202**

Questions?