

Computer Vision II

Fall Semester

Requisites

Does **not** require Computer Vision I.

Linear algebra, Differential calculus, Euclidean geometry in 3D.

Basic knowledge of differential geometry.

Basic knowledge of neural networks.

Basic knowledge of Python.

Times (subject to changes)

Tuesdays 09.30 - 10h50

Thursdays 09.30 - 10h50

Syllabus

Module 1: Visual geometry

1. Differential geometry
2. Discrete geometry
3. Shape and texture processing
4. Shape analysis
5. Shape descriptors
6. Shape classification and reconstruction
1. CNN on 3D meshes
2. Applications
3. Estimation of geometric transformations.
4. Neural implicit representations

Module 2: Deep Generative Models in Computer Vision

1. Review of useful concepts: Probabilities
2. Generative models
3. Auto-regressive models
4. Variational Auto-Encoders
5. Normalizing flows
6. Generative adversarial networks
7. Score-based models.
8. Evaluation of Generative Models.

- 9. Applications (1).
- 10. Applications (2).

Tentative schedule

Date	Topic	Prof.
09/08/2022	Differential geometry of surfaces (1)	T. Batard
11/08/2022	Differential geometry of surfaces (2)	T. Batard
16/08/2022	Discrete geometry (1)	T. Batard
18/08/2022	Discrete geometry (2)	T. Batard
23/08/2022	Shape and texture processing (1)	T. Batard
25/08/2022	Shape and texture processing (2)	T. Batard
30/08/2022	Shape analysis	T. Batard
01/09/2022	Shape descriptors	T. Batard
06/09/2022	Application: Shape classification and recognition	T. Batard
08/09/2022	Shape reconstruction (1)	T. Batard
13/09/2022	Shape reconstruction (2)	T. Batard
15/09/2022	Shape reconstruction (3)	T. Batard
20/09/2022	CNN on meshes (1)	T. Batard

22/09/2022	CNN on meshes (2)	T. Batard
27/09/2022	Applications (1)	T. Batard
29/09/2022	Applications (2)	T. Batard
04/10/2022	Estimation of geometric transformations through NNs (1)	J.B. Hayet
06/10/2022	Estimation of geometric transformations through NNs (2)	J.B. Hayet
11/10/2022	Neural implicit representations (1)	J.B. Hayet
13/10/2022	Neural implicit representations (2)	J.B. Hayet
18/10/2022	Review of useful concepts: Probabilities	J.B. Hayet
20/10/2022	Generative models	J.B. Hayet
25/10/2022	Auto-regressive models	J.B. Hayet
27/10/2022	Variational Auto-Encoders (1)	J.B. Hayet
01/11/2022	Variational Auto-Encoders (2)	J.B. Hayet
03/11/2022	Normalizing flows	J.B. Hayet
08/11/2022	Generative adversarial networks (1)	J.B. Hayet
10/11/2022	Generative adversarial networks (2)	J.B. Hayet
15/11/2022	Score-based models	J.B. Hayet
17/11/2022	Evaluation of Generative Models	J.B. Hayet
22/11/2022	Applications (1)	J.B. Hayet
24/11/2022	Applications (2)	J.B. Hayet