

Due to the conference, we will not hold lectures on 24 May and 25 May. As compensation, we prepare this document to introduce some advanced topics on the **combination of multiple view geometry and deep learning**.

Note: This knowledge **will NOT be asked in the final exam**. However, we still suggest that you make time to look through them since they may be helpful for your future guided research/IDP/thesis projects.

### **Part 1. 3D Shape Representation**

1. DeepSDF: Learning Continuous Signed Distance Functions for Shape Representation, CVPR 2019  
Paper:

[https://openaccess.thecvf.com/content\\_CVPR\\_2019/papers/Park\\_DeepSDF\\_Learning\\_Continuous\\_Signed\\_Distance\\_Functions\\_for\\_Shape\\_Representation\\_CVPR\\_2019\\_paper.pdf](https://openaccess.thecvf.com/content_CVPR_2019/papers/Park_DeepSDF_Learning_Continuous_Signed_Distance_Functions_for_Shape_Representation_CVPR_2019_paper.pdf)

Video:

<https://www.youtube.com/watch?v=L1LRJzMQw5o>

2. Convolutional Occupancy Networks, ECCV 2020

Paper:

<https://www.cvlibs.net/publications/Peng2020ECCV.pdf>

Video:

<https://www.youtube.com/watch?v=EmauovgrDSM>

### **Part 2. Novel View Synthesis (Neural Rendering)**

1. NeRF: Representing Scenes as Neural Radiance Fields for View Synthesis, ECCV 2020

Paper:

[https://www.ecva.net/papers/eccv\\_2020/papers\\_ECCV/papers/123460392.pdf](https://www.ecva.net/papers/eccv_2020/papers_ECCV/papers/123460392.pdf)

Video: <https://www.youtube.com/watch?v=dPWLYbp4LLO>

### **Part 3. Structure from Motion / Visual SLAM**

1. Pixel-Perfect Structure-from-Motion with Featuremetric Refinement, ICCV 2021

Paper:

[https://openaccess.thecvf.com/content/ICCV2021/papers/Lindenberger\\_Pixel-Perfect\\_Structure-From-Motion\\_With\\_Featuremetric\\_Refinement\\_ICCV\\_2021\\_paper.pdf](https://openaccess.thecvf.com/content/ICCV2021/papers/Lindenberger_Pixel-Perfect_Structure-From-Motion_With_Featuremetric_Refinement_ICCV_2021_paper.pdf)

Video:

<https://www.youtube.com/watch?v=2HuCMuraFk0>

2. iMAP: Implicit Mapping and Positioning in Real-Time, ICCV 2021

Paper:

[https://openaccess.thecvf.com/content/ICCV2021/papers/Sucar\\_iMAP\\_Implicit\\_Mapping\\_and\\_Positioning\\_in\\_Real-Time\\_ICCV\\_2021\\_paper.pdf](https://openaccess.thecvf.com/content/ICCV2021/papers/Sucar_iMAP_Implicit_Mapping_and_Positioning_in_Real-Time_ICCV_2021_paper.pdf)

Video:

<https://www.youtube.com/watch?v=c-zkKGArI5Y>

3. NICE-SLAM: Neural Implicit Scalable Encoding for SLAM, CVPR 2022

Paper:

[https://openaccess.thecvf.com/content/CVPR2022/papers/Zhu\\_NICE-SLAM\\_Neural\\_Implicit\\_Scalable\\_Encoding\\_for\\_SLAM\\_CVPR\\_2022\\_paper.pdf](https://openaccess.thecvf.com/content/CVPR2022/papers/Zhu_NICE-SLAM_Neural_Implicit_Scalable_Encoding_for_SLAM_CVPR_2022_paper.pdf)

Video:

<https://www.youtube.com/watch?v=V5hYTz5os0M>

4. D3VO: Deep Depth, Deep Pose and Deep Uncertainty for Monocular Visual Odometry

Paper:

[https://openaccess.thecvf.com/content\\_CVPR\\_2020/papers/Yang\\_D3VO\\_Deep\\_Depth\\_Deep\\_Pose\\_and\\_Deep\\_Uncertainty\\_for\\_Monocular\\_CVPR\\_2020\\_paper.pdf](https://openaccess.thecvf.com/content_CVPR_2020/papers/Yang_D3VO_Deep_Depth_Deep_Pose_and_Deep_Uncertainty_for_Monocular_CVPR_2020_paper.pdf)

Video:

<https://www.youtube.com/watch?v=a7CAkJbhcm8>

#### **Part 4. Feature Matching**

1. SuperGlue: Learning Feature Matching with Graph Neural Networks, CVPR 2020

Paper:

[https://openaccess.thecvf.com/content\\_CVPR\\_2020/papers/Sarlin\\_SuperGlue\\_Learning\\_Feature\\_Matching\\_With\\_Graph\\_Neural\\_Networks\\_CVPR\\_2020\\_paper.pdf](https://openaccess.thecvf.com/content_CVPR_2020/papers/Sarlin_SuperGlue_Learning_Feature_Matching_With_Graph_Neural_Networks_CVPR_2020_paper.pdf)

Video:

<https://www.youtube.com/watch?v=95Eysm0IeB0>

2. FlowNet: Learning Optical Flow with Convolutional Networks, ICCV 2015

Paper:

[https://www.cv-foundation.org/openaccess/content\\_iccv\\_2015/papers/Dosovitskiy\\_FlowNet\\_Learning\\_Optical\\_Flow\\_ICCV\\_2015\\_paper.pdf](https://www.cv-foundation.org/openaccess/content_iccv_2015/papers/Dosovitskiy_FlowNet_Learning_Optical_Flow_ICCV_2015_paper.pdf)

Video:

[https://www.youtube.com/watch?v=k\\_wkDLJ8IJE](https://www.youtube.com/watch?v=k_wkDLJ8IJE)