DOMINIK RIVOIR

PhD Student in Computer Vision for Computer-assisted Surgery working on Video Understanding and Neural Rendering for Surgical Applications.

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RESEARCH INTERESTS & PROJECTS

Unsupervised Neural Rendering for Video Synthesis

- **Goal:** Rendering realistic, view-consistent and diverse video sequences from simulated surgical 3D scenes in unpaired/unsupervised learning settings.
- **Interests:** Neural 3D representations; Unpaired image translation; View consistency

ICCV publication [2] | public code [a,b] | public dataset [c]
part of *"Best of ICCV"* selection in *CV News* [d]

Surgical Procedural Video Understanding

- **Goal:** Investigating domain-specific challenges of procedural video understanding for surgical videos.
- **Interests:** End-to-end spatio-temporal modeling; Pitfalls of BatchNorm; Online recognition for real-time applications; Sparse events/annotations in untrimmed videos

4 publications [1,3,4,5] | 2 awards [h,i] | public code [e,k]

EDUCATION

PhD Student

National Center for Tumor Diseases (NCT)

June 2019 – ongoing, full-time — Dresden, Germany

- Advisor: **Prof. Dr. Stefanie Speidel**
- Topic: "**Adopting Procedural Video Understanding and Video Synthesis for Surgical Computer Vision**"
- Published at: ICCV | MedIA | MICCAI | MICCAI-W
- Reviewed for: CVPR | ICCV | ECCV | MedIA | MICCAI | IPCAI | ...

Diploma in Computer Science (equiv. to M.Sc.)

TU Dresden — **GPA: 1.0** — **Awarded Best CS Graduate**

Oct 2013 – Apr 2019 — Dresden, Germany

- Focus: Machine Learning | CS Theory | Databases
- Thesis: "**Learning Representations for RSD Prediction through Unsupervised Temporal Video Segmentation**"
- Condensed thesis published as [4].

ACTIVITIES

Organizer

CVPR Workshop "Data Curation & Augmentation in Medical Imaging"

Jun 2024 — Seattle, USA

https://dca-in-mi.github.io/

Organizer

Summer School "AI Applications in Medicine"

Sep 2023 — Dresden, Germany

https://www.secai-ceti-summerschool.de/

AWARDS

Outstanding Reviewer Award 2022
at MICCAI 2022
(12 out of 1242 awarded) [f]

Best Reviewer Award 2022
at IPCAI 2022
(2 out of >100 awarded) [g]

Best Paper Award 2019
at MICCAI 2019 workshop "OR 2.0"
for *"Unsupervised temporal video segmentation as an auxiliary task for predicting the remaining surgery duration"* [h]

Best Paper Award (2nd author) 2019
at IPCAI 2019 for *"Active learning using deep Bayesian networks for surgical workflow analysis"* [i]

Lohrmann Medal 2019
as best graduate of TU Dresden's Computer Science department [j]

SKILLS

Machine Learning

- pytorch, tensorboard, opencv (very good)
- numpy, sklearn, pandas, matplotlib (very good)
- tensorflow, keras (basic)

Programming Languages

- Python (very good)
- C++, Java (good)
- Rust, SQL, OWL, Cypher, Prolog (basic)

Other Technologies

- Git, LaTeX, Blender, html, css, kivy

LANGUAGES

English — 2 years in USA '99–'01, 1 year in UK '12–'13, 4 months in USA '16, TOEFL iBT score: 114/120

German — Native

OTHER INTERESTS

Baseball | Arthouse Cinema | Guitar

REFERENCE

Stefanie Speidel (advisor)
stefanie.speidel@nct-dresden.de

SELECTED PUBLICATIONS

[1] *Rivoir, Dominik*, et al. "On the Pitfalls of Batch Normalization for End-to-End Video Learning: A Study on Surgical Workflow Analysis." Medical Image Analysis. 2024.

MedIA (Impact Factor 10.7)

[2] *Rivoir, Dominik*, et al. "Long-term temporally consistent unpaired video translation from simulated surgical 3d data." IEEE/CVF International Conference on Computer Vision. 2021.

ICCV

[3] *Rivoir, Dominik*, et al. "Rethinking anticipation tasks: Uncertainty-aware anticipation of sparse surgical instrument usage for context-aware assistance." International Conference on Medical Image Computing and Computer-Assisted Intervention. Springer, Cham, 2020.

MICCAI

[4] *Rivoir, Dominik*, et al. "Unsupervised temporal video segmentation as an auxiliary task for predicting the remaining surgery duration." OR 2.0 Context-Aware Operating Theaters and Machine Learning in Clinical Neuroimaging. Springer, Cham, 2019.

Best Paper

[5] Bodenstedt, Sebastian, *Rivoir, Dominik*, et al. "Active learning using deep Bayesian networks for surgical workflow analysis." International journal of computer assisted radiology and surgery. 2019.

Best Paper

LINKS

[a] https://gitlab.com/nct_tso_public/surgical-video-sim2real

[b] https://gitlab.com/nct_tso_public/demo-video-sim2real

[c] http://opencas.dkfz.de/video-sim2real/

[d] rsipvision.com/ComputerVisionNews-2021November/24/

[e] https://gitlab.com/nct_tso_public/ins_ant

[f] https://conferences.miccai.org/2022/en/OUTSTANDING-REVIEWER-AWARDS.html

[g] sites.google.com/view/ipcai2022/awards

[h] https://twitter.com/SpeidelStefanie/status/1183310832580481024

[i] https://ipcai2019.github.io/#news

[j] https://tu-dresden.de/tu-dresden/newsportal/news/talente-frueh-unterstuetzen-tud-ehrt-beste-absolvent-innen

[k] https://gitlab.com/nct_tso_public/pitfalls_bn