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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https://scholar.google.de/citations?user=MBADUf0AAAAJ | @DominikRivoir | gitlab.com/users/dmri/contributed

RESEARCH INTERESTS & PROJECTS

Unsupervised Neural Rendering for Video Synthesis

- Goal: Rendering realistic, view-consistent and diverse video sequences from simulated surgical scenes in unpaired/unsupervised learning settings.

Neural Textures | Unpaired Image Translation | View-consistency

ICCV publication [1] </> Public code [a,b] Public synthetic dataset [c]

Part of *"Best of ICCV"* selection in *Computer Vision News* [d]

Surgical Workflow Understanding

- Goal: Investigating challenges of learning from long videos for surgical workflow understanding.
- Previous projects: sparse event anticipation [3], unsupervised learning [4], active learning [5]
- Current project: Pitfalls of BatchNorm for end-to-end video learning [1].

End-to-end | BatchNorm | Sparse Events | Small Data

4 publications [3,4,5] </> Public code [e,k] 2 awards [h,i]

EDUCATION & ACTIVITIES

PhD Student

National Center for Tumor Diseases (NCT)

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

- Advisor: **Prof. Dr. Stefanie Speidel**
- Topic: "**Challenges of Video Learning for Robot-assisted Surgery**"
- Focus: Neural Rendering | Video Understanding
- 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 [3].

Student Computer Vision Developer

T-Systems Multimedia Solutions

Apr 2017 – Mar 2018, part-time | Dresden, Germany

Semester Abroad

Boston University

Aug 2016 – Dec 2016 | Boston, MA, USA

Volunteer Support Worker for People with Learning Disabilities

Norwood Ravenswood Village

Jul 2012 – Jun 2013, full-time | Crowthrone, UK

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." arXiv preprint arXiv:2203.07976 (2022). (accepted at Medical Image Analysis)

MedIA

[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.

[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 Award

[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 Award

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