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 scenes in unpaired/unsupervised learning settings.

| Neural Textures | Unpaired Image Translation | View-consistency |

ICCV publication [2]   </> 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 [1,3,4,5]   </> Public code [e,k]   2 awards [h,i]

EDUCATION

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 [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

[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