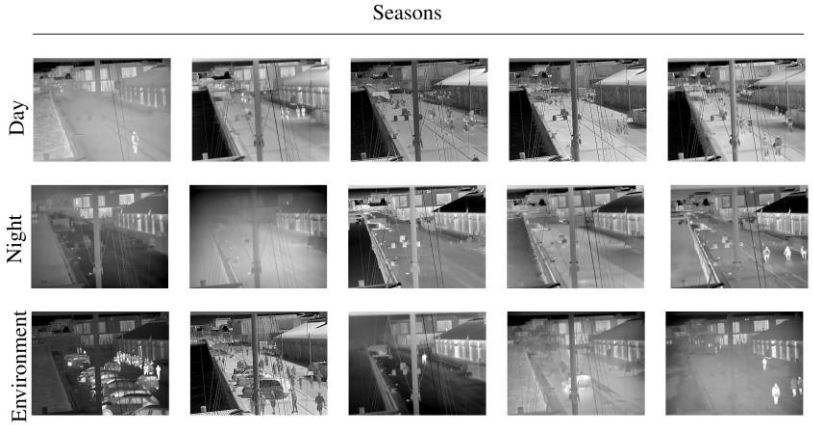
Person Detection in Thermal Imaging



The availability of thermal cameras opens new chances for better person privacy for person monitoring systems. However, in real-life outdoor applications, the performance of deep learning model tends to drop significantly due to conditions changing over time.

Tasks

- Provide an overview of the literature in the field.
- Compare state-of-the-art approaches regarding their methodology.

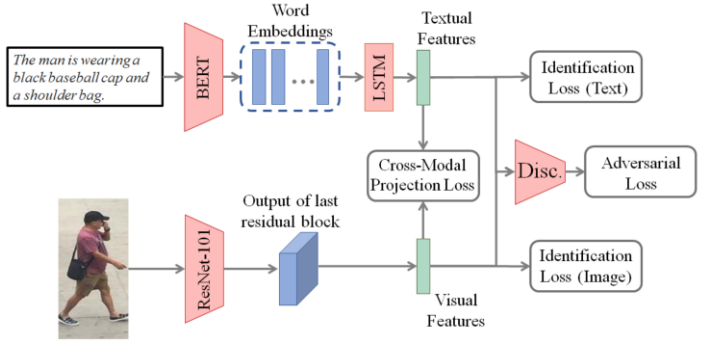
Literature

- I. A. Nikolov, M. P. Philipsen, J. Liu, J. V. Dueholm, A. S. Johansen, K. Nasrollahi, and T. B. Moeslund, “Seasons in drift: A long-term thermal imaging dataset for studying concept drift,” in NeurIPS, 2021.

Supervisor

Mickael Cormier, M.Sc. mickael.cormier@iosb.fraunhofer.de

Person Retrieval in Surveillance Using Natural Language Queries



Natural language-based person retrieval is an important topic in surveillance applications as it enables searching for criminals based on textual person descriptions obtained from witness testimonies. The approaches aim to retrieve all occurrences of individuals matching a given person description from a gallery database.

Tasks

- Provide an overview of the literature in the field
- Compare state-of-the-art approaches regarding their methodology

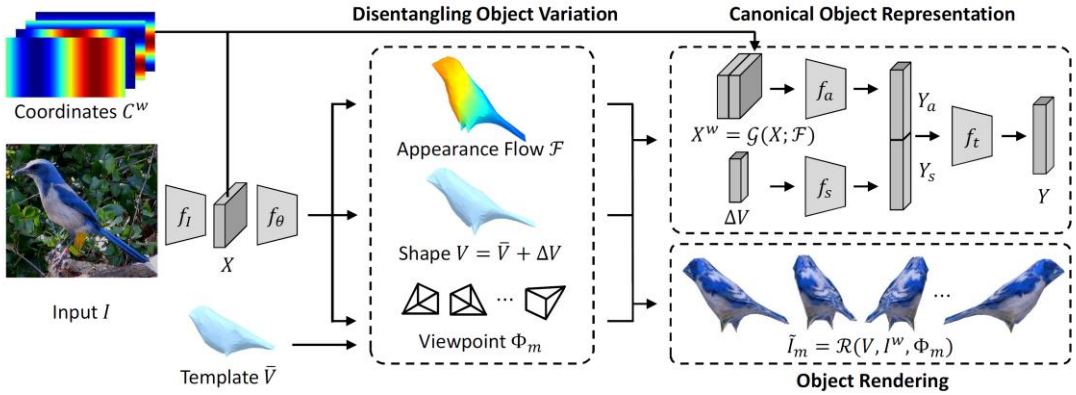
Literature

- Sarafianos N, Xu X, Kakadiaris IA (2019). Adversarial Representation Learning for Text-to-Image Matching. In Proceedings of the IEEE International Conference on Computer Vision (ICCV).

Supervisor

Andreas Specker, M.Sc. andreas.specker@iosb.fraunhofer.de

3D-Aware Fine-Grained Object Recognition



Fine-grained object recognition describes the task of determining the class of an object on a very specific level, e.g. the species of a bird. While most approaches apply an end-to-end learning strategy or basic 2D attention mechanisms, incorporating the 3D structure in the classification process is a promising prospect for improving the recognition accuracy.

Tasks

- Acquire an overview of the literature in the field.
- Compare state-of-the-art approaches regarding their methodology.

Literature

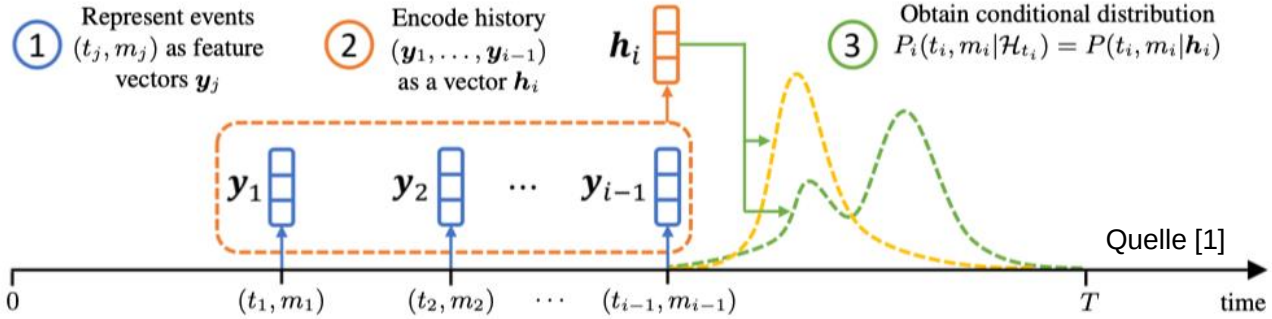
- Joung et al., Learning Canonical 3D Object Representation for Fine-Grained Recognition, ICCV 2021

Supervisor

Stefan Wolf (stefan.wolf@iosb.fraunhofer.de)

Neural Temporal Point Processes

Temporal point processes (TPP) are probabilistic generative models for continuous-time event sequences. Neural TPPs combine the fundamental ideas from point process literature with deep learning approaches, thus enabling construction of flexible and efficient models [1].



Quelle [1]

Aufgaben

- Literature research on neural temporal point processes.
- How do they differ from the classic TPPs? What are the advantages?

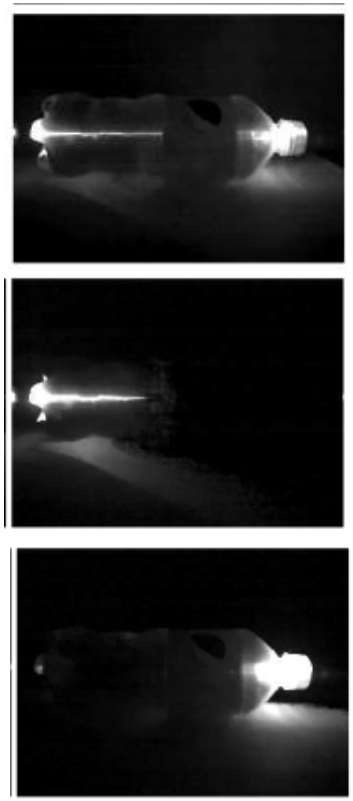
Literatur

- [1] Shchur, Oleksandr, et al. Neural temporal point processes: A review. IJCAI. 2021.
- [2] Du, Nan, et al. Recurrent marked temporal point processes: Embedding event history to vector. KDD. 2016.

Betreuer

Zeyun Zhong(zeyun.zhong@kit.edu)

Transient Imaging



Beim Transient Imaging können Bilder einer Szene aufgenommen werden, während sich das Licht noch in der Ausbreitung befindet. Dazu muss ein passendes Vorwärtsmodell aufgestellt und das resultierende, extrem schlecht gestellte inverse Problem gelöst werden. Basierend auf diesem Ansatz lassen sich beispielsweise Anwendungen wie Non-Line-Of-Sight Imaging („um Ecken gucken“) oder die Bildgewinnung durch stark streuende Medien realisieren.

Aufgabe

- Literaturrecherche zum Thema.
- Aufbereitung der Ergebnisse in Form eines wissenschaftlichen Berichts und einer Präsentation.

Beispielliteratur

- M. O’Toole et al.: „Reconstructing Transient Images from Single-Photon Sensors“, in 2017 IEEE Conference on Computer Vision and Pattern Recognition (CVPR) doi: 10.1109/CVPR.2017.246.
- M. O’Toole et al.: „Confocal non-line-of-sight imaging based on the light-cone transform“, Nature doi: 10.1038/nature25489.

Betreuer

Dr.-Ing. Johannes Meyer (johannes.meyer [at] iosb.fraunhofer.de)