Brno University of Technology
Faculty of Information Technology

Department of Computer Graphics and Multimedia (DCGM) Academic year 2021/2022

Master's Thesis Specification

Student: **Konečný Daniel, Bc.**
Programme: Information Technology and Artificial Intelligence
Specialization: Machine Learning
Title: **Self-Supervised Learning for Recognition of Sports Poses in Image**
Category: Image Processing
Assignment:

1. Study the field of machine learning for computer vision and recognition of sports poses in image and video.
2. Obtain and/or collect a data set (sets) of images of sports poses.
3. Experiment with methods of self-supervised learning on the collected data set (sets).
4. Demonstrate the usability of the developed techniques for recognition of sports poses.
5. Iteratively improve the developed techniques and the data set towards maximal usability.
6. Discuss the achieved results and propose possibilities for future work on the project; create a poster and a short video for presenting the results of the project.

Recommended literature:

- Goodfellow, Bengio, Courville: Deep Learning, MIT Press, 2016
- Bharath Ramsundar, Reza Bosagh Zadeh: TensorFlow for Deep Learning: From Linear Regression to Reinforcement Learning, O'Reily Media, 2018
- Gary Bradski, Adrian Kaehler: Learning OpenCV; Computer Vision with the OpenCV Library, O'Reilly Media, 2008
- Richard Szeliski: Computer Vision: Algorithms and Applications, Springer, 2011
- Grill J-B et al.: Bootstrap your own latent: A new approach to self-supervised Learning, NeurIPS 2020, https://arxiv.org/abs/2006.07733
- Caron M et al.: Emerging Properties in Self-Supervised Vision Transformers, https://arxiv.org/abs/2104.14294
- Sermanet et al.: Time-Contrastive Networks: Self-Supervised Learning from Video, ICRA 2018, https://arxiv.org/abs/1704.06888
- Asano et al.: Self-labelling via simultaneous clustering and representation learning, ICLR 2020, https://arxiv.org/abs/1911.05371
- L. Jing, Y. Tian, Self-supervised visual feature learning with deep neural networks: A survey, IEEE PAMI, 2020

Requirements for the semestral defence:

- Items 1 and 2, considerable development on items 3 through 5.

Detailed formal requirements can be found at https://www.fit.vut.cz/study/theses/

Supervisor: **Herout Adam, prof. Ing., Ph.D.**
Head of Department: Černocký Jan, doc. Dr. Ing.
Beginning of work: November 1, 2021
Submission deadline: July 29, 2022
Approval date: November 1, 2021