TECHNISCHE UNIVERSITÄT MÜNCHEN
Human-centered Assistive Robotics
UNIV.-PROF. DR.-ING. DONGHEUI LEE

December 7, 2020

M A S T E R ' S T H E S I S
for
Ma Shuo
Student ID 03717403, Degree EI

3D Human Motion Modeling using Generative Model based on the Transformer

Problem description:

The problem of predicting human's full-body 3D motion has been a challenge for researchers in various fields. Regarding this, existing works [2] tend to rely on the recurrent neural networks (RNNs), which have been empirically proven to be effective for modeling sequential data. However, recently, the self-attention based model called Transformer [3] has achieved lots of success in sequential data modeling such as natural language processing, and its outstanding performance is drawing attention from many researchers. In this work, the goal is to develop a generative model based on this Transformer, to predict human's full body 3D motion in future. Of course, there exists a work based on the Transformer for 3D human motion modeling [1], but [1] has not improved the performance as much as expected in a quantitative way. Therefore, the student will analyze the pros and cons of past researches, and develop another transformer-based model with better performance in human motion prediction.

Tasks:

- Literature review on 3D human motion modeling and related neural network based models.
- Design and implement a transformer-based neural network for 3D human motion modeling.
- Evaluation and comparison study with baseline models [2, 1].

Bibliography:

[1] Emre Aksan, Peng Cao, Manuel Kaufmann, and Otmar Hilliges. Attention, please: A spatio-temporal transformer for 3d human motion prediction. *arXiv preprint arXiv:2004.08692*, 2020.

[2] Ashesh Jain, Amir R Zamir, Silvio Savarese, and Ashutosh Saxena. Structural-rnn: Deep learning on spatio-temporal graphs. In *Proceedings of the ieee conference on computer vision and pattern recognition*, pages 5308–5317, 2016.

[3] Ashish Vaswani, Noam Shazeer, Niki Parmar, Jakob Uszkoreit, Llion Jones, Aidan N Gomez, Łukasz Kaiser, and Illia Polosukhin. Attention is all you need. In *Advances in neural information processing systems*, pages 5998–6008, 2017.

Supervisor:	Dr. Hyemin Ahn
Start:	xx.12.2020
Intermediate Report:	xx.xx.2021
Delivery:	xx.07.2021

(D. Lee)
Univ.-Professor