Contribution ID: **122** Type: **not specified**

Tensor based Modelling of Human Motion

Tuesday, 14 September 2021 12:20 (20 minutes)

For future industrial applications, collaborative robotic systems will be a key technology. A main task is to guarantee the safety of humans. To detect hazardous situations, commercially available robotic systems rely on direct physical contact to the co-working person, opposed to those systems equipped with predictive capabilities. To predict potential episodes, where the human and the robot might collide, data of a motion tracking sensor system are used. Based on the provided information, the robotic system can avoid the unwanted physical contact by adjusting the speed or the position. A common approach of such systems is to perform human motion prediction by machine learning methods like Artificial Neural Networks. Our aim is to perform human motion prediction of a repetitive assembly task by using a Tensor-on-Tensor regression. To record human motion by means of the OptiTrack motion capture system, infrared reflective markers are placed on corresponding joints of the human torso. The system provides unique traceable Cartesian coordinates (x, y, z) over time for each marker. Furthermore, the recorded data of joint positions was transformed into the joint angle space to obtain the angles of joint points. To predict the human motion, the contracted tensor product for the linear prediction of an outcome array Y from the predictor array X is defined as Y = ⟨X,B⟩ + E, where B is the coefficient tensor and E the error term. The first results are promising for receiving multivariate predictions of highly correlated data in real-time.

Keywords

Human-Robot Collaboration, Human Motion Prediction, Tensor-on-Tensor Regression

Special/invited session

Primary authors: WEDENIG, Philipp; Ms GRIL, Lorena; Ms KLEB, Ulrike

Presenter: WEDENIG, Philipp

Session Classification: Modelling 3