Jiangxin Sun

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Education

Sun Yat-sen University   *Sep. 2020 - Jun. 2023*

M.E. IN COMPUTER SCIENCE AND TECHNOLOGY
- Supervisors: Prof. **Wei-Shi Zheng** & Prof. **Jian-Fang Hu**

Sun Yat-sen University   *Aug. 2016 - Jun. 2020*

B.E. IN COMPUTER SCIENCE AND TECHNOLOGY
- GPA: 3.9/4.0

Research Interests

- My research interests lie in Computer Vision and Machine Learning. My goal is to develop perceptual systems to achieve human-level recognition capabilities and further build intelligent decision-making systems to interact with complex environments.
- Currently, my focus is on interpretable autonomous driving system, semantic/instance segmentation prediction and human motion prediction.

Publications

JOURNAL ARTICLES

APANet: Auto-Path Aggregation for Future Instance Segmentation Prediction [LINK]
  Jian-Fang Hu*, **Jiangxin Sun***, Zihang Lin, Jian-Huang Lai, Wenjun Zeng, Wei-Shi Zheng (* equal contribution)
  *IEEE Transactions on Pattern Analysis and Machine Intelligence (**TPAMI**), 2021*

CONFERENCE PROCEEDINGS

Temporal Continual Learning with Prior Compensation for Human Motion Prediction [LINK]
  Jianwei Tang, **Jiangxin Sun**, Xiaotong Lin, zhang, Wei-Shi Zheng, Jian-Fang Hu
  *Advances in Neural Information Processing Systems (**NeurIPS**), 2023*

You Never Stop Dancing: Non-freezing Dance Generation via Bank-constrained Manifold Projection [LINK]
  Jiangxin Sun, Chunyu Wang, Huang Hu, Hanjiang Lai, Zhi Jin, Jian-Fang Hu
  *Advances in Neural Information Processing Systems (**NeurIPS**), 2022*

Action-guided 3D Human Motion Prediction [LINK]
  Jiangxin Sun, Zihang Lin, Xintong Han, Jian-Fang Hu, Jia Xu, Wei-Shi Zheng
  *Advances in Neural Information Processing Systems (**NeurIPS**), 2021*

Predictive Feature Learning for Future Segmentation Prediction [LINK]
  Zihang Lin*, **Jiangxin Sun***, Jian-Fang Hu, Qizhi Yu, Jiang-Huang Lai, Wei-Shi Zheng (* equal contribution)
  *Proceedings of the IEEE International Conference on Computer Vision (**ICCV**), 2021*

Predicting future instance segmentation with contextual pyramid convlstms [LINK]
  Jiangxin Sun, Jiafeng Xie, Jian-Fang Hu, Zihang Lin, Jian-Huang Lai, Wenjun Zeng, Wei-Shi Zheng
  *Proceedings of the ACM International Conference on Multimedia (**ACM MM**), 2019*

Research Experience

Sun Yat-sen University

UNDERGRADUATE & GRADUATE RESEARCHER   *Aug. 2018 - Jun. 2023*

- Supervisors: Prof. **Wei-Shi Zheng** & Prof. **Jian-Fang Hu**
- Advisors: & Prof. **Wenjun Zeng** & Prof. **Jianguo Zhang**
- **Topic 1: Adaptive Context Aggregation for Segmentation Prediction**
  - Aims to predict future unobserved instance segmentation according to observed past RGB frames. The mainstream is to insert a prediction block into an instance segmentation model (e.g., Mask R-CNN) and to predict future pyramid features.
  - Developed a flexible network for collaboratively predicting multi-level pyramid features.
  - Proposed an adaptive aggregation approach to exploit the underlying structural relationship among pyramid features.
  - Designed auto-path to selectively and adaptively aggregate contextual information among different pyramid levels.
  - Accepted by **ACM MM** 2019 [LINK] & Revised approach accepted by **TPAMI** in 2021 [LINK].

- **Topic 2: Predictive Feature Learning for Segmentation Prediction**
  - Pointed out the contradiction between learning discriminative segmentation features and learning reliable future prediction.
  - Designed an autoencoder-based framework to learn a predictive representation of segmentation features via explicitly modeling prediction uncertainty and introducing uncertainty decay.
  - Proposed an uncertainty-aware prediction module to learn both feature prediction and uncertainty estimation.
  - Preliminary work accepted by **ICCV** 2021 [Link] & Revised approach scheduled to be submitted to **TPAMI**.
- **Topic 3: Temporal Continual Learning for Human Motion Prediction**
  - Identified two main limitations in existing models: the learning of short-term predictions is hindered by the focus on long-term predictions, and the incorporation of prior information from past predictions into subsequent predictions is limited.
  - Proposed a novel multi-stage training framework and introduced a prior compensation factor to tackle the forgetting problem of prior knowledge.
  - Obtained an easily optimized and more reasonable objective function through theoretical derivation
  - Accepted by **NeurIPS** 2023 [Link].

Huya Inc.
RESEARCH INTERN IN COMPUTER VISION GROUP   *Jul. 2020 - Jul. 2021*

- Advisor: Dr. **Xintong Han**
- **Topic: Action-guided Motion Prediction**
  - Aims to predict future unobserved 3D human motion according to observed past RGB frames. The mainstream is to insert a prediction block into a motion capture model and to predict future latent features.
  - Introduced action information into human motion prediction.
  - Constructed an action-specific memory bank to exploit representative sub-actions and retrieved possible motion dynamics to guide future motion prediction
  - Accepted by **NeurIPS** 2021. [Link]

Microsoft Research Asia
RESEARCH INTERN IN INTELLIGENT MULTIMEDIA GROUP   *Aug. 2021 - Jan. 2022*

- Advisor: Dr. **Chunyu Wang**
- **Topic: Non-freezing Dance Generation**
  - Aims to predict future dance choreography conditioned on past motion and music pieces. The mainstream is to learn single-modal feature extractors and a cross-modal predictor.
  - Achieved non-freezing large-magnitude dance generation.
  - Presented bank-constrained manifold projection to suppress the noises in the predicted motions and leveraged the coherence in <past, future> motion dynamics to reduce the uncertainty and ambiguity in motion prediction.
  - Accepted by **NeurIPS** 2022. [Link]

ETH Zurich
RESEARCH ASSISTANT IN COMPUTER VISION LAB   *Aug. 2023 - Present*

- Advisors: Prof. **Fisher Yu**
- **Topic: Semantic Predictive Control for Interpretable Autonomous Driving**
  - Proposed a novel multimodal transformer-based predictive model to anticipate future visual semantics, measurement information and potential events.
  - Designed the forecast conditioned on observed visual inputs, measurement information and selected actions to be performed, leading to an action-conditioned world model.
  - Explicitly evaluated the consequences of actions and select the most appropriate action with maximal driving distance to the destination and minimal violations.
  - This research project is still in progress.

Awards

Outstanding Graduate, *Sun Yat-sen University*	*2023*
National Scholarship, *Sun Yat-sen University*	*2022*