

Institute of Artificial Intelligence

UNIVERSITY OF CENTRAL FLORIDA

FINAL ORAL EXAMINATION

OF

Ming Li

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FOR THE DEGREE OF

DOCTOR OF PHILOSOPHY

(COMPUTER SCIENCE)

26 October 2026, 11 A.M.

Teaching Academy, Room TA 0221

Join via Zoom | Meeting ID: 958 1471 4171 Passcode: 768955

DISSERTATION COMMITTEE

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DISSERTATION RESEARCH IMPACT

Visual generation systems must follow user intent expressed through prompts, structural controls, editing instructions, and preferences. Optimizing a standard denoising loss alone does not directly ensure that the generated result satisfies these goals.

This dissertation develops a reward-centered approach to visual alignment. ControlNet++ turns condition-output consistency into a training signal. SuperEdit repairs inaccurate editing supervision. Semi-DPO separates consistent preferences from conflicting ones and refines noisy labels. ViPO studies robust preference optimization and balanced preference data at scale.

Together, these contributions address the design, correction, relabeling, and scaling of reward signals. They provide methods for more controllable generation, better instruction-based editing, and more reliable preference alignment in image and video generation.

SELECTED PUBLICATIONS

(h-index: 15, total citation: 1,208)

1. **ViPO: Visual Preference Optimization at Scale**. Ming Li, Jie Wu, Justin Cui, Xiaojie Li, Rui Wang, Chen Chen. ICLR, 2026.
2. **Learning from Noisy Preferences: A Semi-Supervised Learning Approach to Direct Preference Optimization**. Xinxin Liu*, Ming Li*, Zonglin Lyu, Yuzhang Shang, Chen Chen. ICLR, 2026.
3. **SuperEdit: Rectifying and Facilitating Supervision for Instruction-based Image Editing**. Ming Li, Xin Gu, Fan Chen, Xiaoying Xing, Longyin Wen, Chen Chen, Sijie Zhu. ICCV, 2025.
4. **ControlNet++: Improving Conditional Controls with Efficient Consistency Feedback**. Ming Li, Taojiannan Yang, Huafeng Kuang, Jie Wu, Zhaoning Wang, Xuefeng Xiao, Chen Chen. ECCV, 2024.
5. **AlignDet: Aligning Pre-training and Fine-tuning in Object Detection**. Ming Li, Jie Wu, Xionghui Wang, Chen Chen, Jie Qin, Xuefeng Xiao, Rui Wang, Min Zheng, Xin Pan. ICCV, 2023.

DISSERTATION

ALIGNING VISUAL GENERATION WITH REWARD SIGNALS

This dissertation studies how to align visual generation with reward signals. Users express intent through prompts, controls, edits, and preferences, but standard denoising objectives do not directly optimize the outcomes by which generated outputs are judged. Here, a reward is a signal that scores or ranks generated outputs against intended visual behavior and is optimized during training. The central thesis is that reliable visual generation requires reward signals that can be designed, rectified when noisy, relabeled when conflicting, and scaled as data. Four contributions develop this thesis. ControlNet++ addresses Reward Design by turning consistency between visual conditions and generated outputs into an explicit reward for efficient diffusion fine-tuning. SuperEdit addresses Reward Rectification by repairing noisy image-instruction supervision and optimizing image editing with a contrastive instruction objective. Semi-DPO addresses Reward Relabeling: multi-reward consensus identifies consistent preference pairs, while conflicting pairs are relabeled using the diffusion model's timestep -conditional pseudo-labels. ViPO addresses Reward Data Scaling through robust preference optimization objectives and high-quality, balanced preference data for image and video generation. Together, these contributions form a progression from reward design and correction to scalable visual preference optimization, supporting alignment between generated outputs and intended visual behavior.



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2016-2020	B.S., Software Engineering, Hainan University, China
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