HAOKUN ZHU

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EDUCATION

Shanghai Jiao Tong University   Shanghai, China
B.Eng in Computer Science and Technology; **GPA:3.84/4.3; 89.41/100**   *Sep. 2020 – Jun. 2024*

RELEVANT COURSEWORK

- Linear Algebra(A+)
- Probability and Statistics(A+)
- C++ Programming(A+)
- Data Structure
- Algorithm and Complexity

- Computer Architecture
- Operating Systems
- Computer Graphics(A+)
- Computer Network(A+)
- Artificial Intelligence(A+)

- Machine Learning(A)
- Introduction to Data Science(A)
- Computer Ethics(A+)
- Cloud Computing(A)
- Information Extraction(A)

PUBLICATIONS (* MEANS EQUAL CONTRIBUTION)

AesStyler: Aesthetic Guided Universal Style Transfer
- Haokun Zhu, Ran Yi, Teng Hu, Yu-Kun Lai, Paul L. Rosin

  Under Review(CVPR 2024). [Website]

SAMVG: A Multi-stage Image Vectorization Model with the Segment-Anything Model
- Haokun Zhu*, Juang Ian Chong*, Teng Hu, Ran Yi, Yu-Kun Lai, Paul L. Rosin

  ICASSP 2024. [ArXiv:2311.05276]

Stroke-based Neural Painting and Stylization with Dynamically Predicted Painting Region
- Teng Hu, Ran Yi, Haokun Zhu, Liang Liu, Jinlong Peng, Yabiao Wang, Chengjie Wang, Lizhuang Ma

  ACM MM 2023. [Code] [ArXiv:2309.03504]

Phasic Content Fusing Diffusion Model with Directional Distribution Consistency for Few-Shot Model Adaption
- Teng Hu, Jiangning Zhang, Liang Liu, Ran Yi, Siqi Kou, Haokun Zhu, Xu Chen, Yabiao Wang, Chengjie Wang Lizhuang Ma

  ICCV 2023. [Code] [ArXiv:2309.03729]

RESEARCH EXPERIENCE

Digital Media Computer Vision Laboratory(DMCV) in SJTU   Shanghai, China
Undergraduate research assistant advised by Prof Ran Yi   *Oct. 2022 – Now*

- **Few-shot Image Generation with Diffusion Model**: how to employ diffusion model in producing high-quality and diverse images in a new domain with only a small number of training data.
- **Aesthetic Guided Universal Style Transfer**: how to transfer the style of an arbitrary image to another content image while striking a balance among aesthetic qualities, style transfromation and content presevation.
- **Stroke-based Neural Painting**: how to recreate a pixel-based image with a set of brushstrokes like real human-beings while achieving both faithful reconstruction and stroke style at the same time.
- **Image Vectorization**: how to transform raster images into scalable vector graphics which have superior adaptability and detailed representation.

TECHNICAL SKILLS

- **Languages**   Python, C/C++, Matlab, LaTex, Mandarin(native), English(fluent, TOEFL: 111)
- **Tools**   PyTorch, TensorFlow, OpenCV, OpenGL, LaTex, Markdown, git

HONORS AND AWARDS

Principal's Award   Shanghai, China
Affiliation: Shanghai Jiao Tong University   *Nov. 2022 - Nov. 2023*

Merit Scholarship   Shanghai, China
Affiliation: Shanghai Jiao Tong University   *2021 & 2022*

RESEARCH PROJECTS

AesStyler: Aesthetic Guided Universal Style Transfer (CV)   *Jun. 2023 - Dec. 2023*
Mentor: Ran Yi, Yu-Kun Lai, Paul L. Rosin

- We propose AesStyler, a novel Aesthetic Guided Universal Style Transfer method, utilizing pre-trained aesthetiic assessment model, a novel Universal Aesthetic Codebook and a novel Universal and Specific Aesthetic-Guided Attention module. Extensive experiments and user-studies have demonstrated that our approach generates aesthetically more harmonious and pleasing results than the state-of-the-art methods. In this project,
  - **I proposed to introduce the aesthetic assessment model, trained on a dataset with human-assessed aesthetic scores, into the universal style transfer task to accurately capture aesthetic features that universally resonate with human aesthetic preferences.**

- I proposed to build a Universal Aesthetic Codebook (UAC) to harness universal aesthetic features that encapsulate the global aspects of aesthetics.
- I proposed the novel Universal and Style-specific Aesthetic-Guided Attention (USAesA) module to guide the style transfer process, empowering our model to integrate the aesthetic attributes of both universal and style-specific aesthetic features with style features and facilitating the fusion of these aesthetically enhanced style features with content features.
- I completed the initial drafting of the research paper by myself, meticulously explaining the methodology, crafting figures to illustrate the pipelines and analysing the experimental results in detail.
- I single-handedly designed and conducted all the experiments, both qualitative and quantitative and 2 user-studies, demonstrating the superiority of AesStyler over current state-of-the-art methods.
- This work is submitted to CVPR 2024.

SAMVG: An Image Vectorization Model with SAM (CV, CG) *Aug. 2023 - Dec. 2023*
Mentor: Ran Yi, Yu-Kun Lai, Paul L. Rosin

- We propose SAMVG, a multi-stage model to vectorize raster images into Scalable Vector Graphics. Extensive experiments demonstrate that SAMVG can produce high quality SVGs in any domain with less computation time and complexity compared to previous SOTA methods. In this project,
    - I collaborated with the co-author to propose three innovative aspects.
    - I finished the final drafting of the paper, elaborating in detail on the methodology and conducted a thorough analysis of the experimental results in the paper.
    - This work is accepted by ICASSP 2024.

Stroke-based Neural Painting with Dynamical Region (CV) *Oct. 2022 - Mar. 2023*
Mentor: Ran Yi

- We propose Compositional Neural Painter, a novel stroke-based rendering framework which dynamically predicts the next painting region based on the current canvas, instead of dividing the image plane uniformly into painting regions. In this project,
    - I conducted most of the baseline comparison experiments, which demonstrates that our model outperforms the existing models in stroke-based neural painting.
    - This work is accepted by ACM MM 2023.

Few-Shot Diffusion Model Adaption (CV) *Feb. 2023 - Mar. 2023*
Mentor: Ran Yi

- We propose a novel phasic content fusing few-shot diffusion model with directional distribution consistency loss, which targets different learning objectives at distinct training stages. In this project,
    - I contributed to the paper's composition and created several illustrative figures to elucidate our methodologies within the paper.
    - I conducted the majority of the baseline comparison experiments, demonstrating the superiority of our approach in few-shot generative model adaption tasks.
    - This work is accepted by ICCV 2023.

COURSE PROJECTS

Image-to-Image Translation: From Line to Sketch (CV) *May. 2023*

- This is the CS3511 course project. We use two frameworks, pix2pix and pixel2style2pixel(pSp), to solve an image-to-image translation task: line generation sketch task. We achieved great results in the workshop of CGI-PSG2023 with this project, ranking 3rd in FID and 2nd in SSIM. In this project,
    - I completed the pSp part of the project report by myself, explaining the methodology, crafting figures to illustrate the pipelines and analysing the experimental results in detail.
    - I completed the coding aspect of pSp in this project and conducted all qualitative and quantitative experiments of pSp in the report, demonstrating the superiority of pSp in line generation sketch task.

Real-time Ray Tracing with OpenGL (CG) *Dec. 2022*

- This is the CS3310 Computer Graphics course project, focusing on implementing real-time ray tracing in OpenGL to produce visual effects such as shadows, reflections, and refractions. It integrates the SMAA algorithm for anti-aliasing and enhances ray tracing efficiency through techniques like the Bounding Volume Hierarchy. In this project,
    - I completed the project report, explaining the methodology, crafting figures to illustrate the pipelines and conducting an in-depth analysis of the experimental results.
    - I accomplished the majority of the work on our OpenGL pipeline and successfully implemented the BVH acceleration algorithm, achieving real-time ray tracing.

Sentiment Analysis with Bert (NLP) *Dec. 2022*

- This is the CS3307 Internet Information Extraction course project. This project focuses on the Positive and Negative Sentiment Analysis, a binary sentiment analysis issue. Text sentiment analysis has a wide range of applications in fields such as social media and public opinion monitoring. In this project,
    - I conducted comprehensive preliminary research, established the technical approach, and preliminarily implemented the code for sentiment classification using Bert.
    - I completed the main body of the experimental report, in which I detailed our methods and pipeline, and provided an in-depth analysis of the experimental results.