Isaac Zhang

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EDUCATION

Master of Machine Learning and Computer Vision

Australia National University
ANU College of Engineering, Computing and Cybernetics — Aug 2021-present
GPA:6.7/7
Expected Date of Graduation: Jul 2023

Bachelor of Science with Specialization in Computing Science

University of Alberta — Sep 2017-Jul 2021
Faculty of Science, Computing Science department
GPA: 3.3/4.0

RESEARCH & PROJECTS

Research Assistance — Aug 2022-present

3D Reconstruction in Hongdong Li's group

The goal of this research is to reconstruct a complete 3D scene or object shape from a set of photos and achieve the state-of-arts. We mainly focus on RGB images as inputs only, i.e., the 3D mesh can be reconstructed from any photos from smartphones cameras etc.

- Assisted Professor Li's group to reproduce paper which mainly focus on the latest 3D reconstruction field
- Focused on Multiview reconstruction from 2D images to give the model some physical meaning while improving its performance, rather than relying solely on the model to guess like in single-view reconstruction
- Used the most classic method of extracting sparse point clouds and camera poses from SFM
- Found that adding normal priors on the NerF/Neus model can outperform state-of-the-art results
- Tried different geometry expressions to replace others like (Neus replaced volume density of the NerF model with SDF)

Semester Project — Aug-Nov 2022

Real-time Portrait Matting

The project lasted for one semester and aimed to solve the problem of real-time Portrait Matting. Unlike current techniques that make models learn the mix coefficient alpha by giving the model a picture of the foreground and background respectively, we proposed a method to extract the Portrait by taking advantage of background subtraction.

- Archived real-time inference for video streaming and images
- No ground-truth required; only soft segmentation binary masks were applied for the labels in the training phase to guide the model
- Proposed model could decompose foreground and background information by its two encoders
- A unique decoder was in the pipeline for integrating concatenated F/B feature maps to generate the transparency feature
- L1 loss was applied to pixel-wisely to optimize generated background pictures / RGBA pictures / foreground pictures

Independent Research

Background Subtraction Algorithm — Jan-May 2022

A project started independently in the group, making the model learn the difference between background and foreground motion patterns through mathematical modelling. This algorithm can be used with moving cameras and is not sensitive to the lighting environment.

- Proposed a new algorithm hm that does not rely on any neural network but can also archive good results
- Can be used for both static and moving cameras
- Stable and reliable model that requires only the first few frames to detect the background before and after the whole scene

- Can apply on background subtraction and moving object tracking
- Each Pixies can be classified within high confidence interval through epipolar constraint

Online Ride-hailing App on Android, *Team Leader* Jan-Apr 2020

The project was mainly to provide online ride-hailing services by connecting driver end and user end. It charges by distance based on Google maps, realizes cloud data storage by Firebase, and introduces Uber driver-passenger grading system.

- Established and maintained the database, synchronized the network between cloud data and the local user end, and performed QR code scanning and analysis.
- Led the team to design UML diagram according to use cases to meet user requirements
- Determined app structure and distributed tasks to team members
- Integrated all parts to produce the ride-hailing app that could be put into use.

Image Recognition Oct-Nov 2019

The project aimed at calling MNIST database to recognize numbers in an image; professor marked students according to their accuracy of models and I was ranked in top 10 out of 120.

- Designed the neural network model, optimized parameters, and trained and tested the model.
- Gained experience in many NN structures, such as U-net, encoder-decoder, etc.

INTERNSHIP EXPERIENCE

H3C Technologies Co., Ltd, *data analyst* Aug-Oct 2020

- Cleansed and processed data, established models to extract valuable information.
- Helped make strategic decisions by organizing data and realizing data visualization.

CIB Digital Financial Service Co., Ltd, *front-end developer* Jun-Jul 2020

- Built front-end webpages and back-end database according to company demands
- Participated in the development of banking operation system with Java

EXTRACURRICULAR ACTIVITIES

Hackthon, Major League Hacking Oct 2019

A group of people with a passion for computer technology signed up for a 2-3 day "marathon programming" project. The project was for a group of 5 people, and the task of our group was to organize the photos taken by the satellite and then classify and compress them.

- Apply the bag-of-words model to images: For each image, split into patches to extract SIFT points for each block as feature vectors
- Store all the feature vectors and use K-means clustering to get a Vocabulary
- Take each image as a query, use the vector of the query image and each cluster of Vocabulary as L2 distance, and take the nearest cluster center as the class. Finally, Optimize the construction time of Vocabulary in two directions, using PCA to reduce the vector dimension and K-means initialization through the probability distribution.

AWARDS & HONORS

Continuing International Award, 1st class 2018 - 2020
An International Student Scholarship (Honor Entrance) 2017
Certificate of Great Course Representative 2022

Computer SKILLS

- Machine Learning - Tensorflow, Pytorch, NumPy, Pandas
- Development - Flask, Vue, React, Android Studio, IntelleJ, VS Code, PyCharm
- Programing Language: - Python, Java, C, Lisp, SQL, JavaScript