Siyi Du

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EDUCATION

M.A.Sc. in Electrical & Computer Engineering 2021.9-Present

University of British Columbia (UBC), Vancouver, BC, Canada

- Average Grade: 94% Supervisor: Dr. Rafeef Garbi
- Research assistant in the Biomedical Signal and Image Computing Laboratory (BiSICL)

B.Eng in Automation (Pattern Recognition Direction) 2017.9-2021.7

Beihang University, Beijing, China

- GPA: 3.84/4.0 (Ranking: Top 5), GRE: 327+3.5
- Undergraduate Research assistant in the Intelligent Computing & Machine Learning Laboratory (ICMLL)

PUBLICATION

- **Du, S.** and Hers, B. and Bayasi, N. and Hamarneh, G. and Garbi, R., FairDisCo: Fairer AI in Dermatology via Disentanglement Contrastive Learning. *European Conference on Computer Vision (ECCV 2022) Workshops (Seventh ISIC Skin Image Analysis Workshop)*, **Accepted**
- Jiang, X. and **Du, S.** and Qin, Z. and Sun, Y. and Yu, J., KBGN: Knowledge-Bridge Graph Network for Adaptive Vision-Text Reasoning in Visual Dialogue, *The 28th Association for Computing Machinery International Conference on Multimedia (ACM MM2020)*, **Published**

RESEARCH EXPERIENCE

Multi-domain Learning for Skin Lesion Segmentation based on Transformer 2022.8-Present

BiSICL, UBC Supervisor: Prof. Rafeef Garbi

- Propose a multi-domain learning strategy that aggregates knowledge from multiple skin lesion segmentation datasets to alleviate the insufficiency of single-domain samples for training a data-hungry transformer
- Design a domain-guidance self-attention mechanism to adaptively focus on different heads across domains

Deep Learning Fairness in Skin Lesion Classification 2021.1-2022.8

BiSICL, UBC Supervisor: Prof. Rafeef Garbi

- Was one of the first to investigate ethic disparity and various fairness algorithms in skin lesion classification task
- Proposed a disentanglement network with contrastive learning to mitigate skin-tone unfairness and avoid accuracy deterioration, achieving the best performance on the Fitzpatrick17k and DDI datasets (Increased average accuracy and fairness score by up to 5.96% and 15.22% compared with the baseline)
- Investigated common pre-processing and in-processing strategies and adapted two fairness metrics to better compare models, showing the the existence of skin-tone unfairness
- Accepted as a full paper in *ECCV ISIC Workshop 2022*

Multi-modal Visual Dialogue Based on Deep Learning 2020.4-2021.5

ICMLL, Beihang University Supervisor: Prof. Zengchang Qin

- Proposed a novel model using graph neural network (GNN) to bridge the cross-modal gap and was the first to apply graph structure to capture implicit dependence between two modalities in fine granularity
- Developed a more flexible information selection mode to adaptively retrieve information from vision and text knowledge, and utilized discriminative and generative decoders to generate the answer in the visual dialogue
- Implemented models on VisDial v1.0 and VisDial-Q datasets and achieved the state-of-the-art results (outperformed previous SOTA model by 0.62% on R@1)
- Accepted as a full paper in *ACM MM 2020*

Data Bias in Visual Dialogue Task 2020.10-2021.6

ICMALL, Beihang University Supervisor: Prof. Zengchang Qin

- Introduced a language branch and cost sensitive loss into a data bias mitigating model based on Transformer to encourage predictive answers using vision and language modalities together

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- Achieved the best results on VisDialConv and a self-designed data bias mitigating test set split from VisDial v1.0
- Combined experiments and results as a bachelor thesis

Adaptation of Robot to New Environment Based on Self-Supervised Learning 2020.3-2020.10

Summer Research Intern, Cognitive Robotics and AI Lab, Kent State university Supervisor: Prof. Rui Liu

- Designed a novel encoder based on self-supervised learning to capture the high dimensional representation of objects' features related to similar physics laws in both old and new environments.
- Devised a policy decision module to generate action sequences based on representations extracted by the encoder

COURSE PORJECT

3D Ultrasound Segmentation using Transformer 2022.1-2022.4

UBC Supervisor: Prof. Renjie Liao

- Combined CNN and Transformer to create a hybrid model with an axial attention to speed up computations
- Outperformed previous SOTA methods by 1.3% in 3D DDH (Development dysplasia of the hip) dataset

Skin Lesion Semantic Segmentation based on Transform 2022.1-2022.4

UBC Supervisor: Prof. Helge Rhodin

- Developed a hybrid framework combining ResUnet and Transformer and utilized the prior boundary information to assist the model to distinguish ambiguous boundaries.
- Outperformed Unet by 2% on IOU in the ISIC 2018 dataset and achieved better generalizability than the baseline

COMPETITION

Meritorious Winner, 2020 Mathematical Contest in Modeling in USA Beijing, China

Design of the Longest Lasting Sandcastle Model Based on Cellular Automata (CA) 2020.3

- Wielded MATLAB to build a mathematical model of wet sand pile with liquid bridge force between each sand
- Improved the traditional Cellular Automata algorithm via adding probability to simulate the process of sand loss
- Utilized correlation analysis and linear regression to find the superior shape of sandcastle

OTHER INFORMATION

Honors:

- The Research Assistant Scholarship in UBC 2021-2022
- The International Tuition Awards in UBC 2021-2022
- The 1st Prize of National Mathematics Competition for College Students 2018.10
- Won the National Encouragement Scholarship in China 2018-2020
- Won the Prize of Outstanding Student in Beihang University 2018-2019

Activities:

- Teaching assistant, Engineering Graphics, Beihang University 2018.9-2019.7
- Teaching assistant, Medical Imaging, UBC 2022.9-Present

Computer Skills: Python, C, MATLAB, Verilog HDL, AutoCAD, Assembly Language, SolidWorks