Wenxuan Ding

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Research Interests

- My research interests mainly lie in Natural Language Processing, specifically in understanding and expanding knowledge abilities of LLMs, commonsense reasoning, theory of mind, and NLP for social good.

Education

- **The Hong Kong University of Science and Technology** Hong Kong SAR
  Bachelor of Engineering in Computer Science, Minor in Mathematics 2020.9 - 2024.5 (expected)
  Overall GPA: 4.045/4.3 Major GPA: 4.170/4.3 Minor GPA: 4.3/4.3 **Rank: 1/112**
- **University of Illinois Urbana-Champaign** Champaign, IL
  The Grainger College of Engineering, Exchange Student 2022.9 - 2022.12
  GPA: 4.0/4.0

Related courses:
Natural Language Processing (A+), Machine Learning (A+), Algorithm (A+), Big Data Mining (A+), Database Management (A), Combinatorial Optimization (A+), System Programming (A+), Probability (A+), Linear Algebra (A+)

Publications

[1] **Knowledge Crosswords: Geometric Reasoning over Structured Knowledge with Large Language Models [code]**
Wenxuan Ding*, Shangbin Feng*, Yuhan Liu, Zhaoxuan Tan, Vidhisha Balachandran, Tianxing He, Yulia Tsvetkov.
Under review at *ICLR 2024*.

[2] **CAR: Conceptualization-Augmented Reasoner for Zero-Shot Commonsense Question Answering [code]**
Weiqi Wang*, Tianqing Fang*, **Wenxuan Ding**, Baixuan Xu, Xin Liu, Yangqiu Song, Antoine Bosselut.
In *Findings of EMNLP 2023*.

[3] **QADYNAMICS: Training Dynamics-Driven Synthetic QA Diagnostic for Zero-Shot Commonsense Question Answering [code]**
Haochen Shi, Weiqi Wang, Tianqing Fang, Baixuan Xu, **Wenxuan Ding**, Xin Liu, Yangqiu Song.
In *Findings of EMNLP 2023*.

[4] **Benchmarking Large Language Models as E-Commerce Agents with Theory-of-Mind via Large-scale Eventuality Graph Mining**
Wenxuan Ding*, Weiqi Wang*, Huihao Jing, Tianqing Fang, Jiaxin Bai, Xin Liu, Junxian He, Yangqiu Song, Chen Luo.
Ongoing Work; To Be Submitted to *ACL 2024*.

Research Experiences

TsvetShop, University of Washington 2023.3 - Present
Advisor: Yulia Tsvetkov, Assistant Professor at UW & Adjunct Professor at CMU

- **Knowledge Crosswords: Geometric Reasoning Over Structured Knowledge with Large Language Models**
  - Proposed "geometric reasoning over structured knowledge" and Knowledge Crosswords benchmark, a multi-blank QA dataset, to evaluate such reasoning ability
  - Conducted extensive experiments to evaluate LLMs and prompting approaches on the Knowledge Crosswords benchmark
  - Introduced two new instruction-based approaches, Verify-All and Staged Prompting which achieve top performance with ChatGPT and GPT4, and are more robust with hard problems
  - Presented further analysis showing geometric reasoning ability of LLMs suffers from various factors and is far from perfect

KnowComp Group, HKUST 2023.2 - Present

Advisor: Yangqiu Song, Associate Professor at HKUST

- **Benchmarking Large Language Models as E-Commerce Agents with Theory-of-Mind via Large-scale Eventuality Graph Mining**
  - Proposing ECommerceToM benchmark to evaluate the LLMs' reasoning ability with e-commerce ToM
  - Introducing a new prompting method leveraging the context from ASER2.1 to assist reasoning and evaluating it together with other baselines
- **CAR: Conceptualization-Augmented Reasoner for Zero-Shot Commonsense Question Answering**
  - Co-proposed CAR, a zero-shot commonsense QA framework, which leverages conceptualization to augment CSKBs, improving knowledge coverage and reducing false-negative distractors
  - Proposed and implemented a conceptualization-constraint sampling strategy for generating distractors with concept-level constraints to create informative and fair QA pairs
  - Assessed model confidence and variability with training dynamics and demonstrated the superiority of CAR in promoting robustness and boosting OOD generation
- **QADYNAMICS: Training Dynamics-Driven Synthetic QA Diagnostic for Zero-Shot Commonsense Question Answering**
  - Co-proposed QADYNAMICS, a training dynamics-driven framework for QA diagnosis and refinement
  - Participated in in-depth analysis and human evaluation, demonstrating the superior effectiveness of QADYNAMICS in identifying machine-detectable artifacts, uninformative QA pairs, and mislabeled/false-negative options

Projects & Experiences

- **Scoliosis X-ray Image Processing and Curvature Analysis with Deep Learning**
  Advisor: Qifeng Chen, Assistant Professor at HKUST 2022.3 - 2022.5
  - Labeled spine outlines of 39 categorized scoliosis X-ray images with LabelMe and applied data augmentation methods to enlarge the dataset
  - Implemented U-Net with PyTorch for semantics segmentation and generated segmented and masked images
  - Implemented LeNet and VGG-11 for scoliosis classification and achieved an accuracy of 97% with LeNet
- **Acoustic Based Gesture Recognition with Machine Learning**
  Advisor: Qian Zhang, Chair Professor at HKUST 2021.9 - 2021.12
  - Used Raspberry Pi platform to develop a gesture recognition system
  - Collected over 60 pieces of acoustic data and extracted distance information from phase
  - Leveraged machine learning technique to categorize samples into 3 types

Services

- Reviewer for EACL 2024

Standardized Tests

- TOEFL: 113 (R30+L30+S25+W28)
- GRE: 329 (V159+Q170) + AW4.0

Honors & Awards

- Dean's List for all active semesters at HKUST
- University's Scholarship for Continuing Undergraduate Students (top 2%) 2021/22, 2022/23
- Chiaphua Industries Limited Scholarships for Chinese Mainland Undergraduate Students 2021/22
- VTech Group of Companies Scholarship 2022/23

Skills

- **Programming skills**: Python, C/C++, Oracle SQL
- **Frameworks & Tools**: PyTorch, HTML, Flask, Git, GDB, LaTeX