Wenxuan Ding

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RESEARCH INTERESTS

- My research interests mainly lie in Natural Language Processing, specifically in leveraging machines as guides to comprehend the human world, exploring the reasoning abilities of LLMs, commonsense reasoning, 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*.

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 Intention Reasoner in E-commerce**

- Proposing ECOMMERCEINTENTION benchmark to evaluate the LLMs' reasoning ability with e-commerce intention
- Introducing new prompting methods leveraging the context from ASER2.1 to assist reasoning and evaluating it together with other baselines
- Performing error analysis to interpret the intention reasoning ability of existing models

- **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