

DSA Research Experiences for Undergraduates

Research Project

Section1: Faculty Information

Full Name	Zixin Zhong	Tel	
Thrust/Hub	DSA/INFH	Office	W1-308
Email	zixinzhong@hkust-gz.edu.cn		

Section2: Research Project Proposal

Project Title	Exploration the brain activities during memory retrieval
Project Description (max 800 words)	<p>Despite the large amount of existing study, the mechanisms underlying how we retrieve episodes of experience are still yet to known. The project aims to explore the mechanisms beyond memory retrieval by analyzing the real dataset which records the brain activities during memory retrieval. Students will get access to real dataset (and even ask for new data when needed) and analyze it with various machine learning tools. Some related works are as below:</p> <p>[1] Wimmer, G. E., Liu, Y., Vehar, N., et al. Episodic memory retrieval success is associated with rapid replay of episode content. <i>Nature neuroscience</i>. 2020. 23(8): 1025-1033.</p> <p>[2] Liu, Y., Dolan, R. J., et al. Human replay spontaneously reorganizes experience. <i>Cell</i>. 2019. 178(3), 640-652.</p> <p>[3] Liu, Y., Dolan, R. J., Higgins, C., Penagos, H., et al. Temporally delayed linear modelling (TDLM) measures replay in both animals and humans. <i>Elife</i>. 2021. 10: e66917.</p>
Proposed Research Duration	Start Date: <u>2025</u> / <u>03</u> / <u>15</u> End Date: <u>2025</u> / <u>09</u> / <u>01</u>
Student/Researcher Duties	<p>Conduct state-of-the-art algorithms to analyze the mechanism beyond memory retrieval.</p> <p>Design and analyzed novel reasonable models to understand the mechanisms.</p>
Technical Skills Required	<input checked="" type="checkbox"/> Python <input checked="" type="checkbox"/> Machine Learning <input type="checkbox"/> Big Data <input type="checkbox"/> R <input type="checkbox"/> Deep Learning <input type="checkbox"/> SQL <input type="checkbox"/> C/C++ <input type="checkbox"/> Other: _____
Preferred Student/Researcher Background	Mathematics, programming, interests in psychology
Maximum Number of Students/Researchers	<input type="checkbox"/> 1 <input checked="" type="checkbox"/> 2

Section3: Pre-Application Research Exposure Meeting

Faculty members are encouraged to schedule a Research Exposure Meeting to introduce students to their projects.

Preferred Date	
Preferred Time	
Meeting Mode	<input type="checkbox"/> In-Person <input type="checkbox"/> Online
Venue (if in-person)	In-person is preferred
Meeting Link (if online)	Per request