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HANOI UNIVERSITY
OF SCIENCE AND TECHNOLOGY

Artificial Intelligence for Sustainable Society (AISS) Interview

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ONE LOVE. ONE FUTURE.

Agenda

- Brief Introduction
- Motivation - My Journey Toward Sustainability
- Knowledge and Skills Expected to Acquire from AISS Program
- Interested Topic and Potential Directions for Master’s Thesis
- Career Plan

About Me

- My name is Khanh.
- Bachelor's student in **Data Science and Artificial Intelligence** at Hanoi University of Science and Technology (HUST), Vietnam.
- HUST is ranked **451-500** in **Computer Science and Information System** by QS World University Rankings by Subject 2024.
- One exchange semester in Germany.
- Five-month research internship in Singapore.
- **Open to new challenges** as opportunities to grow.

First Motivation to Contribute to Sustainability

- Firsthand experience with daily sustainable practices.
- Belief in a sustainable future.

Vietnam

- No facility for waste sorting.
- No formal system for plastic bottle recycling.
- Unnecessary use of plastic bags.
- Bad urban development.



Illustrations for sustainable practices in Vietnam. From left to right, (1) no waste separation facility, (2) typical Vietnamese grocery shopping, and (3) Hanoi from above.

Germany

- Effective waste sorting.
- Plastic bottles deposit refund (Pfand) scheme.
- Reuseable shopping bags are common.
- A lot of green space in cities.

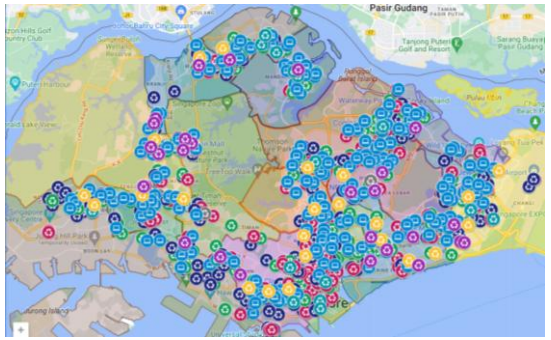
Illustrations for sustainable practices in Germany. From left to right, (1) waste separation guideline, (2) plastic bags charging, and (3) English Garden in Munich.

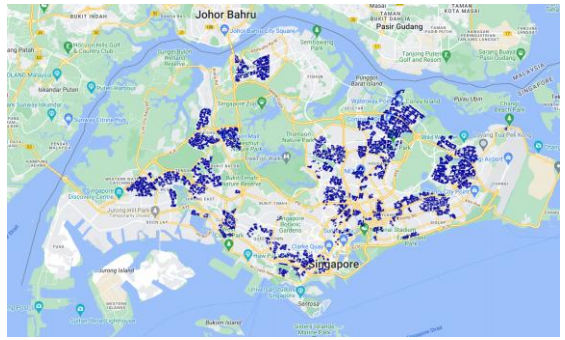
Electronic Waste Collection and Recycling Behaviors Modeling

- Problem Statement:
  - Increase in electronic waste (e-waste) generation and low recycling rate.
  - Value and environmental impact of e-waste.
- Objective: Develop a computational model to access recycling interventions.
- Method: Agent-Based Modeling.
- Key insights: Importance of **proximity** of e-waste collection points and residents' **recycling knowledge** on recycling participation.

DID YOU KNOW?

60% of Singapore residents **do not know** how to recycle their electronic waste.





E-waste collection locations and public housing in Singapore.

Visualization of our simulation.

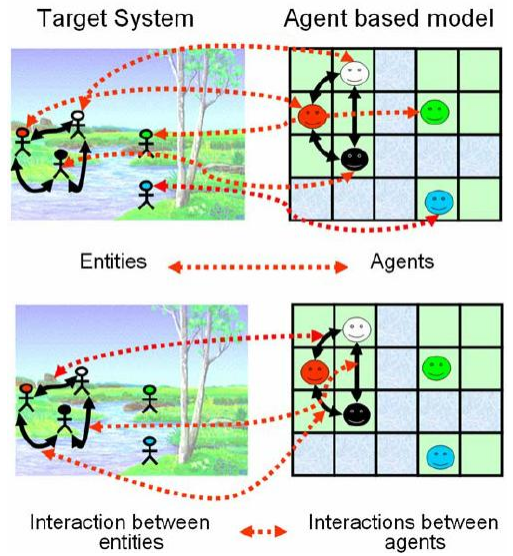
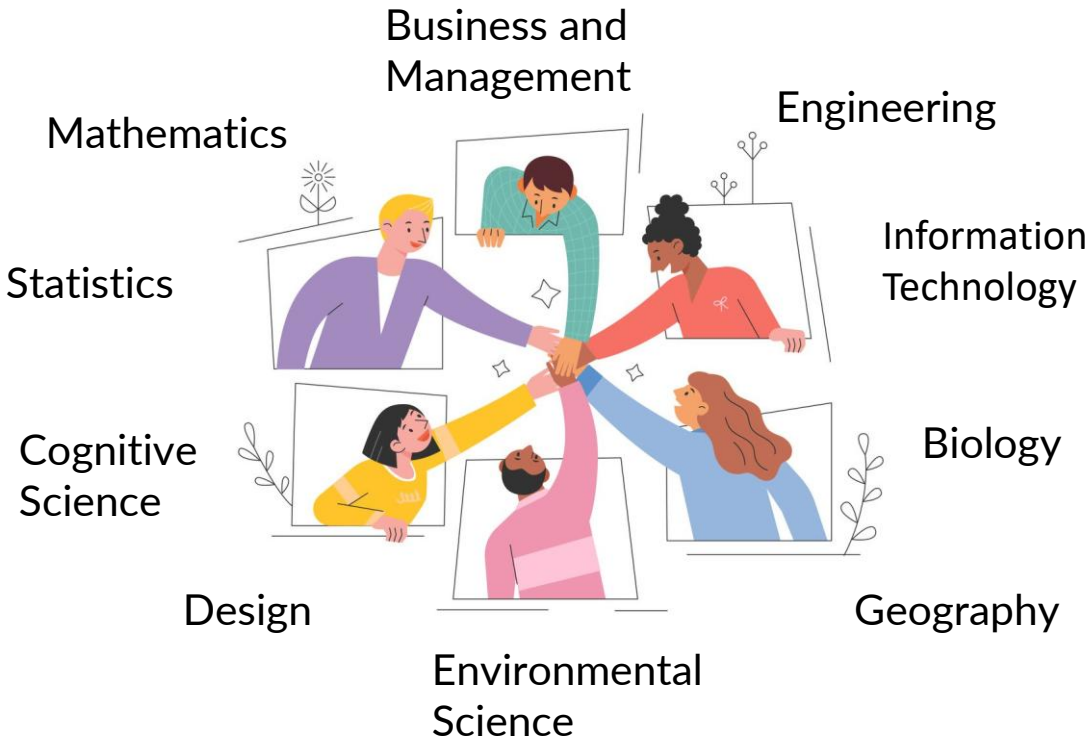


Illustration of Agent-Based Modeling.

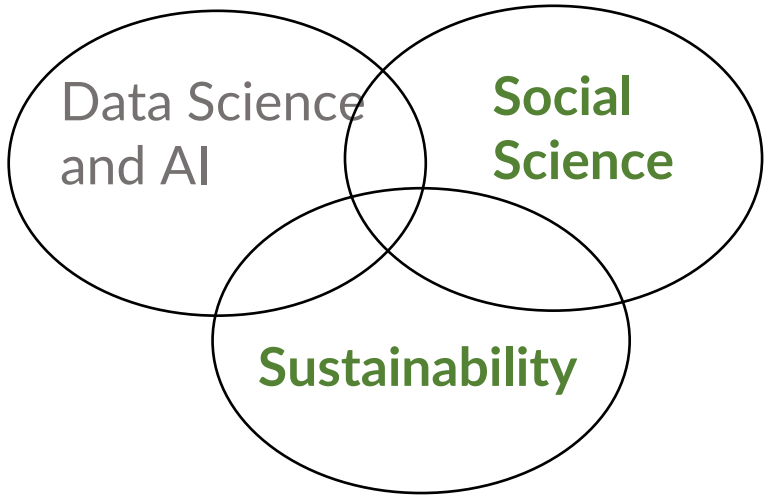
Advance Career in Sustainability - Applying for AISS Program

- More systematic, advanced, and broader knowledge with a Master's study is essential.
- Expected experience from AISS:
  - **Interdisciplinary study**: Solving complex problems requires interdisciplinary approaches.
  - **Diverse scientific community** caring for the Earth.
  - Opportunities to work on **real-world challenging problems**.



Knowledge and Skills Expected to Acquire

- Knowledge in **Sustainability** and **Social Science** to complement my expertise in Data Science and AI, e.g. civic engagement, sustainable development goals, diversity and inclusion in society.
- **Research competences,** such as:
  - Define problems and research questions.
  - Research methods.
  - Research plan and proposal.
  - Research communication.
- Skills to apply acquired knowledge in practice.



Knowledge and Skills Expected to Acquire

Electronic Waste Collection and Recycling Behaviors Modeling

Potential extensions

1. Complex sustainable indicators, e.g. carbon emission.
2. Design of recycling interventions.
3. Design of recycling information campaign.
4. System optimization by enhancing individual decision making.

Useful AISS courses:

- Sustainable Development Goals and Guidelines.
- Civic engagement.
- Fundamental of Accessibility.
- Collective Intelligence for Socio-Technical System.

February 2024
Research internship in Singapore

Interested AISS Topics

- **Socio-technical systems** e.g. Transportation, Waste Management, Energy System.
- Potential directions for Master's thesis:
  1. **Computational model** for assessment of **social transformation** toward new sustainable innovations.
  2. **Collective Intelligence** and **Multi-Agent Reinforcement Learning** for system optimization by enhancing individual decisions making with collaboration and competition of multiple stakeholders.

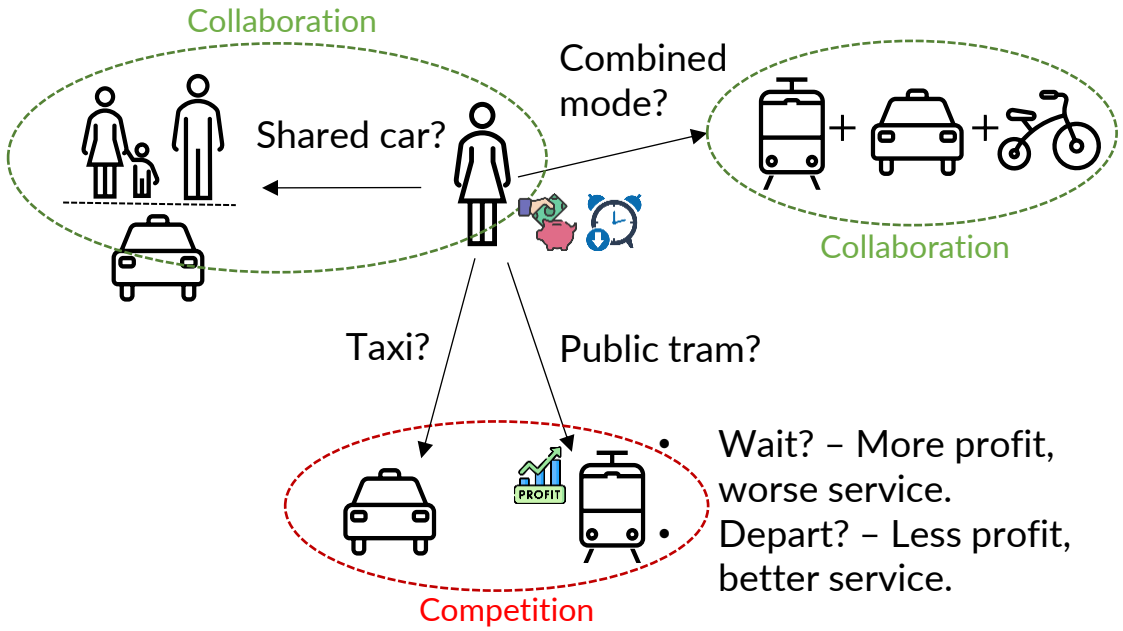
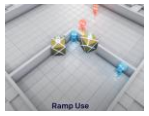


*Illustration of the second potential direction for Master's thesis. A **transportation system** with participation of **multiple stakeholders** with different, even conflict, objectives. Multiple transportation modes are available. Will the objectives of the whole system be optimized by optimizing individual objectives?*



Example of multi-agent reinforcement learning applied to hide and seek game developed by OpenAI https://www.youtube.com/watch?v=kopoLzvh5jY

Career Plan

- Upon finishing AISS program:

  PhD position in Artificial Intelligence, Modeling with application to sustainable **socio-technical systems**, e.g. sustainable transportation, waste reduction, and green energy system.

- **Researcher** in academia or R&D section, specialized in computational aspect of sustainability.

We Can Make a Difference!

"You may live in the world as it is, but you can still work to create the world as it should be."

Michelle Obama

Together, with a small step at a time, we can create a sustainable future!