BS6220:
Spatial and Multi-omics Data Analytics and Machine Learning

Overview of week 8 & 13 schedule
and assessment format

Yeo Hock Chuan, PhD

Self-introductions

Dr Yeo Hock Chuan[1]

- Senior Scientist,
- Bioinformatics Institute @A*STAR

(Computational Biology & omics analysis group)

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Research Interest[2]

- Develop innovative causal process modeling & data-driven approach to elucidate actionable insights regarding biological & biotechnological systems

- Leverages multi-omics data analyses and systems biology & AI modelling

1. https://www.linkedin.com/in/hock-chuan-yeo-22ab4221/?originalSubdomain=sg
2. https://scholar.google.com.sg/citations?hl=en&user=cw4XSBQAAAAJ&view_op=list_works&sortby=pubdate

Schedule of topics to cover

Week 8 (16th Jan)

- Application of ML for output optimization in synthetic biology
- Deep modeling & exploration of cell-wise metabolism using single-cell RNA-seq data

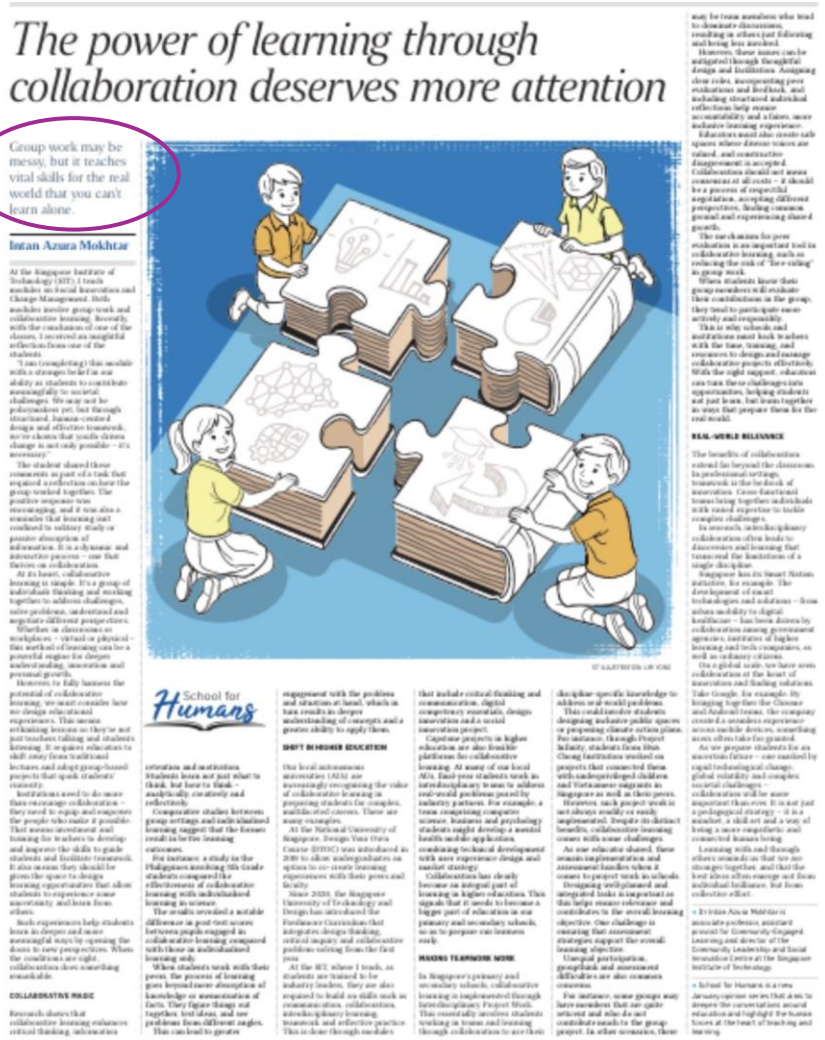
Week 13 (20th Feb)

- Optimal experimental design for machine learning
- Reproducibility, pitfalls & leakage in ML-based sciences
- Presentation of self-directed group learning on given topic

What we could learn from group learning (besides subject matter)

Group work may be messy, but it teaches vital skills for the real world that you can't learn alone:

Straits time, 6th Jan 2026



The power of learning through collaboration deserves more attention

Group work may be messy, but it teaches vital skills for the real world that you can't learn alone.

Intan Azura Mokhtar

School for Humans

- Self-direct learning
- Articulate ideas
- How to work synergistically as a team
- Think critically
- Initiative/leadership
- Realization that team work carry you further
- Self awareness & empathy, …

→ Apply ourselves

Mode of learning: experientially

- Learning by doing rather than being spoon-fed
- Real-world connection: emphasis on skilful application & innovation
- Active engagement: take initiative & make decisions
- Multiple capabilities: self-learning, technical, communication, etc.
- Reflection: what was learned that is applicable to your area of interest?

Assessment format & grading criteria

Assessment format

Team-based self-learning & presentation

- 20% of overall assessment
- ~6 person per team: member list & *algorithm* to present
  to be submitted by team leader
  via NTUlearn by 23rd Jan 2026
- Assessment: (i) max 7 min in class presentation
  (ii) pre-recorded presentation
  (iii) PowerPoint slides (ppt format)
- To be submitted by team leader
  via NTUlearn by 22rd Feb 2026 2359 hrs

- Usage of generative AI allowed **as per university guidelines**

Grading criteria

Key sections of slides (40%)

- Purpose of ML algorithm chosen by team
- One real-world application (Keep it Simple)
- Explain how algorithm works, using a numeric example[1] (Keep it Simple)

Format (10%)

- Non-verbose (key words/phrases)

(Notes may be made in Powerpoint's Note section)

- References
- Aptos font suggested: header font size 36-40, content font size 16-28

1. e.g., https://www.frontiersin.org/journals/ecology-and-evolution/articles/10.3389/fevo.2022.1010278/full

Grading criteria

Outperformance (50%)

- Intuitive, self-explanatory slides
- Good flow
- Instructive for peers
- Effective sharing via class presentation & recording

Explicitly acknowledge what resources have been used & the specific ways they are used (e.g., gen AI)

Grading criteria

Last slide to state *significant* contribution
of individual team members, e.g.,

- *Class presentation: Peter, … (1 to 2 pax expected)*
- *Recorded presentation: Lee (1 pax expected)*
- *Research & slides preparation: Sue, … (2 to 3 pax expected)*
- *Numeric example of algorithm computation: … (1 to 2 pax expected)*
- *Coordination: … (1 pax expected)*

- Individuals may contribute in more than one area

List of ML algorithms
for group-learning & presentation

Deep learning is heavily used in many domain applications.

Select one of following related algorithms for your learning:

- Forward propagation (Neural network)
- Back propagation (Neural network)
- Forward propagation (Mathematical expression)
- Back propagation (Mathematical expression)
- Bayesian belief propagation

Question?