

# Bryan Wong

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## RESEARCH STATEMENT

My current research focuses on **multimodal AI for gigapixel medical images**, advancing how **vision-language models (VLMs)** and **multimodal LLMs** understand large, complex visual data. Through **HiVE-MIL [C08]**, vision–language foundation models are combined with multiple instance learning to model interactions across different magnifications, enabling more structured multi-scale understanding. However, such pipelines remain inherently static, motivating a shift toward **agent-based multimodal AI** that can dynamically navigate, explore, and reason across vast visual spaces in a more flexible and intelligent manner.

## EDUCATION

### Korea Advanced Institute of Science and Technology (KAIST)

Ph.D., Data Science (GPA: 4.02 / 4.3) [[Transcript](#)]

Daejeon, South Korea

Aug. 2023 – Aug 2027 (expected)

### Korea Advanced Institute of Science and Technology (KAIST)

M.S., Data Science (GPA: 3.98 / 4.3) [[Transcript](#)] [[Diploma](#)]

Daejeon, South Korea

Aug. 2021 – Aug. 2023

### National Taiwan University of Science and Technology (NTUST)

B.S., Computer Science (GPA: 3.87 / 4.3) [[Transcript](#)] [[Diploma](#)]

Taipei, Taiwan

Sep. 2018 – June 2021

## PUBLICATIONS

### International Conference Publications

#### C08 Few-Shot Learning from Gigapixel Images via Hierarchical Vision-Language Alignment and Modeling [PDF] [Code] [OpenReview, Poster, Slide & Video]

**Bryan Wong\***, Jongwoo Kim\*, Huazhu Fu, and Mun Yong Yi

*The Thirty-Ninth Annual Conference on Neural Information Processing Systems (NeurIPS)*, 2025.

(Acceptance rate: 5,290 / 21,575 = 24.52%)

**TL;DR:** We introduce HiVE-MIL, a hierarchical vision–language MIL framework for gigapixel WSIs that models cross- and intra-scale vision–language interactions, enabling efficient classification and interpretable predictions.

#### C07 Not All Options Are Created Equal: Textual Option Weighting for Token-Efficient LLM-Based Knowledge Tracing [PDF] [Code] [Poster]

Jongwoo Kim\*, SeongYeub Chu\*, **Bryan Wong**, and Mun Yong Yi

*Conference on Empirical Methods in Natural Language Processing (EMNLP Findings)*, 2025.

(Acceptance rate: 1,812 / 8,174 = 22.16% for Main; 1,420 / 8,174 = 17.35% for Findings)

**TL;DR:** We present LOKT, an LLM-based knowledge tracing framework that converts learner option selections into textual weights, enabling token-efficient and interpretable prediction of student performance.

#### C06 Leveraging Multi-Facet Paths for Heterogeneous Graph Representation Learning [PDF] [Code]

Jongwoo Kim, SeongYeub Chu, Hyeyoungmin Park, **Bryan Wong**, Keejun Han, and Mun Yong Yi

*34<sup>th</sup> ACM International Conference on Information and Knowledge Management (CIKM)*, 2025.

(Acceptance rate: 443 / 1,627 = 27%)

**TL;DR:** We introduce MF2Vec, a heterogeneous-graph representation framework that leverages dynamic, fine-grained multi-facet paths instead of rigid meta-paths to learn robust node embeddings.

#### C05 MicroMIL: Graph-based Contextual Multiple Instance Learning for Patient Diagnosis Using Microscopy Images [PDF] [Code] [Poster]

Jongwoo Kim\*, **Bryan Wong**\*, Huazhu Fu, Willmer Rafell Quiñones Robles, Young Sin Ko, and Mun Yong Yi

*28<sup>th</sup> International Conference on Medical Image Computing and Computer Assisted Intervention (MICCAI)*, 2025.

(Acceptance rate: 1,014 / 3,447 = 29%)

**TL;DR:** We propose MicroMIL, a graph-based multiple instance learning framework that dynamically reduces redundancy and models contextual relationships in microscopy images for robust weakly supervised diagnosis.

**C04 Rationale Behind Essay Scores: Enhancing S-LLM's Multi-Trait Essay Scoring with Rationale Generated by LLMs** [\[PDF\]](#) [\[Code\]](#) [\[Poster\]](#)

SeongYeub Chu\*, Jongwoo Kim\*, **Bryan Wong**, and Mun Yong Yi

*Annual Conference of the North American Chapter of the Association for Computational Linguistics (NAACL Findings)*, 2025.

**TL;DR:** We introduce RMTS, a multi-trait essay scoring framework that integrates LLM-generated trait-specific rationales with a fine-tuned S-LLM to improve scoring accuracy and interpretability.

**C03 Rethinking Pre-Trained Feature Extractor Selection in Multiple Instance Learning for Whole Slide Image Classification** [\[PDF\]](#) [\[Code\]](#) [\[Poster\]](#)

**Bryan Wong**, Sungrae Hong, and Mun Yong Yi

*IEEE International Symposium on Biomedical Imaging (ISBI)*, 2025.

**TL;DR:** We evaluate how the choice of pre-trained feature extractor, considering dataset size and diversity, backbone architecture, and pre-training method, affects MIL performance on gigapixel pathology images (WSIs).

**C02 Towards Classifying Histopathological Microscope Images as Time Series Data** [\[PDF\]](#) [\[Poster\]](#)

Sungrae Hong, Hyeong Min Park, Youngsin Ko, Sol Lee, **Bryan Wong**, and Mun Yong Yi

*IEEE International Symposium on Biomedical Imaging (ISBI)*, 2025.

**TL;DR:** We recast microscope images from pathology as time-series sequences, using dynamic time-warping and attention-based pooling to stabilize classification despite varying acquisition lengths.

**C01 Analyzing Gender Pay Gap in STEM Fields by Life Trajectory** [\[PDF\]](#) [\[Poster\]](#)

Wenchao Dong, **Bryan Wong**, Hasnain Irshad Bhatti, Lanu Kim, and Meeyoung Cha

*8<sup>th</sup> International Conference on Computational Social Science (IC2S2) and Korea Computer Congress (KCC)*, 2022.

**TL;DR:** We analyze gender pay disparities in STEM through life trajectory modeling, highlighting career dynamics contributing to the pay gap.

## International Journal Publications

**J01 A Predicted-Loss Based Active Learning Approach for Robust Cancer Pathology Image Analysis in the Workplace** [\[PDF\]](#)

Mujin Kim, Willmer Rafell Quiñones Robles, Youngsin Ko, **Bryan Wong**, Sol Lee, and Mun Yong Yi

*BMC Medical Imaging*, 2024.

**TL;DR:** We introduce a predicted-loss based active learning method that dynamically filters out noisy patches and selects informative ones, enabling robust high-accuracy pathology image classification.

## Preprints

**P02 Leveraging Spatial Context for Positive Pair Sampling in Histopathology Image Representation Learning** [\[PDF\]](#)

Willmer Rafell Quiñones Robles, Sakonporn Noree, Youngsin Ko, **Bryan Wong**, Jongwoo Kim, and Mun Yong Yi  
*Preprint*, 2025.

**TL;DR:** We propose a spatial context–driven sampling strategy for self-supervised learning (SSL) in pathology that leverages coherence among spatially adjacent patches in gigapixel pathology images (WSIs).

**P01 PreMix: Label-Efficient Multiple Instance Learning via Non-Contrastive Pre-Training and Feature Mixing** [\[PDF\]](#) [\[Code\]](#)

**Bryan Wong** and Mun Yong Yi

*Preprint*, 2024.

**TL;DR:** We propose PreMix, a label-efficient multiple instance learning framework that uses non-contrastive pre-training and feature mixing to improve WSI classification with limited labels.

## ACADEMIC SERVICES

- **Reviewer:** MICCAI 2025

- **Student Volunteer:** MICCAI 2025 [\[Photo\]](#)

## SUMMER SCHOOL

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- **Oxford Machine Learning (OxML 2024) [Certificate]** : Selected participant in the OxML 2024 program, focusing on MLx Health & Bio, MLx Representation Learning, and Generative AI tracks.

## WORK EXPERIENCE

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<b>Data Engineer Intern</b> <a href="#">[Certificate]</a> <i>Commerce Connector by PriceSpider</i>	Oct 2020 – Aug 2021 Taipei, Taiwan
<ul style="list-style-type: none"><li>Designed and implemented web crawling pipelines to collect pricing data for Buy Now Online (single store) and Buy Now In Stores (multi-store price comparison).</li><li>Migrated ParseHub to an enterprise-scale crawling environment, optimizing efficiency and scalability.</li><li>Integrated PriceSpider crawler by configuring API-based subscriptions, setting up an EC2 receiver, processing raw data through AWS Lambda, and storing structured feeds in Amazon S3.</li><li>Led the Data Engineering team, conducting monthly strategy meetings to enhance data collection and processing workflows.</li></ul>	July 2020 – Sep 2020 Taipei, Taiwan

## SCHOLARSHIPS & AWARDS

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- **KAIST International Graduate Scholarship (2021–2027)** [\[Certificate\]](#): Fully-funded Master's and Ph.D. scholarship covering tuition, living expenses, and national health insurance.
- **ICATI Jakarta Scholarship Award (2021)** [\[Certificate\]](#): Awarded by the Indonesian Taiwan Alumni Association (ICATI) for outstanding performance in the 2020 academic year.
- **Minister's Award for Overseas Community Affairs (2020)** [\[Certificate\]](#): Awarded by the Overseas Community Affairs Council, Republic of China (Taiwan), for outstanding academic performance and dedication.

## SOCIAL SERVICE

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- **Member of Project Let's Go (2020)** [\[Photos\]](#): Taught English and STEAM subjects at Chishang Junior High School through hands-on experiments and coding sessions.

## REFERENCES

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<b>Prof. Mun Yong Yi</b> Ph.D. Advisor (KAIST) • E-mail: <a href="mailto:munyi@kaist.ac.kr">munyi@kaist.ac.kr</a> • <a href="#">Website</a>	Daejeon, South Korea 2023.08–
<b>Dr. Huazhu Fu</b> Mentor & Research Collaborator (IHPC, A*STAR) • E-mail 1: <a href="mailto:hzfu@ieee.org">hzfu@ieee.org</a> • E-mail 2: <a href="mailto:fu_huazhu@a-star.edu.sg">fu_huazhu@a-star.edu.sg</a> • <a href="#">Website</a>	Singapore, Singapore 2024.09–