Begench Hangeldiyev

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https://begench-han.github.io/

Research Interests

My research interests focus on the intersection of artificial intelligence and biological systems, particularly leveraging deep learning and graph neural networks for protein engineering and antibody design. Outside my primary research, I contribute to interdisciplinary projects, such as computational nuclear history research, combining data analysis and AI methodologies. I also explore broader machine learning domains, such as computer vision, neural rendering, and diffusion models, while enhancing my practical AI skills with tools like CUDA and hardware accelerators.

Education

Korea Advanced Institute of Science and Technology (KAIST) September 2024 – Present
M.Sc. in Robotics Program. **Advisor:** Prof. Tae-Kyun Kim Daejeon, South Korea

Korea Advanced Institute of Science and Technology (KAIST) August 2020 – August 2024
B.Sc. in Computer Science (*Minor:* Chemical & Biomolecular Engineering) Daejeon, South Korea

Research Experience

Graduate Research Assistant September 2024 – Present
KAIST, *Computer vision and Learning lab (KCVL)* Daejeon, South Korea

- Developing advanced deep learning techniques to improve the wet-lab expressibility of targeted protein classes.
- Building a GNN-based model to enable rapid evaluation of the effectiveness of antibody candidates by analyzing antigen-antibody complexes.

Research Assistant October 2024 – Present
KAIST, *Technology and History of Environment and Nuclear (THEN) Lab* Daejeon, South Korea

- Developing a dataset by analyzing Russian academic journal data on nuclear power to enable computational nuclear history research.

Research Intern June 2022 – August 2024
Institute for Basic Science (IBS), *Data Science Group* Daejeon, South Korea

- Proposed new antibody-specific models for protein sequence design using graph attentive neural networks.
- Supported the development of an AI-based framework for antigen-conditioned antibody design.

Research Intern April 2022 – June 2022
KAIST, *Neuro-Machine Augmented Intelligence Laboratory (NMAIL)* Daejeon, South Korea

- Collaborated on the development of a deep learning model capable of operating with a wide range of robot grippers enabling the manipulation of objects with different shapes.

Publications

[1] **B. Hangeldiyev**, A. Rzayev, A. Armanuly, L. F. Vecchietti, M. Cha*, H. Kim*, "**Antibody Sequence Design With Graph-Based Deep Learning Methods**" presented at the Korea Software Congress (KSC), Jeju, South Korea, 2022.

[2] L.F.Vecchietti, M. Lee, **B. Hangeldiyev**, H. Jung, H. Park, T-K. Kim, M. Cha, H.M. Kim,"**Recent advances in interpretable machine learning using structure-based protein representations,**"arXiv:2409.17726,2024.

Honors and Awards

Gold Medal in National Chemistry Olympiad, 2019, Turkmenistan
Gold Medal in Amity International Chemistry Olympiad, 2019, New Delhi, India
Bronze Medal in National Chemistry Olympiad, 2020, Turkmenistan

Projects

Neural Radiance Fields | ***Python*** Fall 2023
Korea Advanced Institute of Science and Technology(KAIST)

PointNet Model | ***Python*** Fall 2023
Korea Advanced Institute of Science and Technology(KAIST)

CUDA Implementation of Convolutional Layers | ***Python, C, CUDA*** Fall 2023
Korea Advanced Institute of Science and Technology(KAIST)

Web3 Eco-Friendly App | ***JavaScript(React, Ethers), Solidity*** Spring 2023
Korea Advanced Institute of Science and Technology(KAIST)

Parent-Friendly Web App Design | ***Figma*** Spring 2023
Korea Advanced Institute of Science and Technology(KAIST)

Skills

Languages: Turkmen (Native), English (Fluent), Turkish, Russian
Programming Languages: Python, JavaScript, Scala, C, C++, CUDA, Java, HTML5, CSS
Python libraries (Deep Learning, Data Science): PyTorch, Numpy, Pandas, Scikit-learn
Web Programming: ReactJS, HTML5, CSS