

SUNGJOON PARK

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EDUCATION

Doctor of Philosophy

Mar 2018 – Feb 2024

Department of Computer Science and Engineering, Seoul National University

- Thesis: "Empowering domain experts with cloud-based drug prediction tools: from kinase inhibition to drug response and side effects"
- Advisor: Prof. Sun Kim

Bachelor of Science

Mar 2011 – Aug 2017

Department of Computer Science and Engineering, Seoul National University

RESEARCH PROJECTS

AI-based drug discovery

2019 – Present

- Linking a large *in vivo* clinical database of The Cancer Genome Atlas (TCGA) to *in vitro* experiments from Cancer Cell Line Encyclopedia (CCLE) using matrix factorization to recommend a personalized medicine
- Prediction of drug side-effect frequency by mapping drugs and side effects onto a common embedding space using deep learning and ensemble methods

Multi-omics integrative analysis on the cloud

2020 – 2022

- Survey on machine learning methods to investigate gene regulations by utilization of multi-omics data
- Deploying an integrative analysis pipeline on Amazon Web Service (AWS) by combining tools for single nucleotide variations (SNVs), transcriptomics, copy number variations (CNVs), and DNA methylation

Study of COPD pathogenesis using machine learning

2020 – 2023

- Etiological study of environmental factors such as cigarette smoke extract and particulate matter in chronic obstructive pulmonary disease (COPD) proteome data from air-liquid interface (ALI) cultured cells
- Cross validation with independent public data of single cell transcriptomics from Sequence Read Archive (SRA)

Homomorphic encryption to detect point mutations

2018 – 2019

- Assay genomic sequence to find single nucleotide polymorphisms (SNPs) without sharing a private key of the encrypted patient DNA with the hospital
- Devise of the first secure SNP panel scheme to encrypt the genomic data using an open source homomorphic encryption library (HEAAN)

PUBLICATIONS

[In Press] **ALPACA: A Visual Data Mining System for Subcellular Location-specific Knowledge Mining from Multi-Omics Data in Cancer**

M Pak, D Jeong, S Park, J Gu, S Lee and S Kim, BMC Bioinformatics .

Dual representation learning for predicting drug-side effect frequency using protein target information.
[doi:10.1109/jbhi.2024.3350083](https://doi.org/10.1109/jbhi.2024.3350083)

S Park, S Lee*, M Pak, and S Kim, Journal of Biomedical and Health Informatics (2024).*

Machine Learning-based Proteomics Reveals Ferroptosis in COPD Patient-derived Airways Epithelial Cells upon Smoking Exposure. [doi:10.3346/jkms.2023.38.e220](https://doi.org/10.3346/jkms.2023.38.e220)

JK Yoon, S Park*, KH Lee*, D Jeong, J Park, SM Yi, D Han, CG Yoo, S Kim, and CH Lee, Journal of Korean Medical Science, 38(29) (2023).*

EnsDTI-kinase: Web-server for Predicting Kinase-Inhibitor Interactions with Ensemble Computational Methods and Its Applications. [doi:10.1101/2023.01.06.523052](https://doi.org/10.1101/2023.01.06.523052)

Y Lu, S Lim*, S Park, MG Choi, CY Cho, S Kang, and S Kim, bioRxiv, 2023-01 (2023).*

BioVLAB-Cancer-Pharmacogenomics: tumor heterogeneity and pharmacogenomics analysis of multi-omics data from tumor on the cloud. [doi:10.1093/bioinformatics/btab478](https://doi.org/10.1093/bioinformatics/btab478)

S Park, D Lee*, Y Kim, S Lim, H Chae, and S Kim, Bioinformatics, 38(1), 275-277 (2022).*

A review on compound-protein interaction prediction methods: Data, format, representation and model. [doi:10.1016/j.csbj.2021.03.004](https://doi.org/10.1016/j.csbj.2021.03.004)

S Lim, Y Lu, CY Cho, I Sung, J Kim, Y Kim, S Park, and S Kim, Computational and Structural Biotechnology Journal, 19, 1541-1556 (2021).

Machine learning-based analysis of multi-omics data on the cloud for investigating gene regulations. [doi:10.1093/bib/bbaa032](https://doi.org/10.1093/bib/bbaa032)

M Oh, S Park*, S Kim, and H Chae, Briefings in bioinformatics, 22(1), 66-76 (2021).*

DRIM: A web-based system for investigating drug response at the molecular level by condition-specific multi-omics data integration. [doi:10.3389/fgene.2020.564792](https://doi.org/10.3389/fgene.2020.564792)

M Oh, S Park, S Lee, D Lee, S Lim, D Jeong, K Jo, I Jung, and S Kim, Frontiers in Genetics, 11, 564792 (2020).

A secure SNP panel scheme using homomorphically encrypted K-mers without SNP calling on the user side. [doi:10.1186/s12864-019-5473-z](https://doi.org/10.1186/s12864-019-5473-z)

S Park, M Kim, S Seo, S Hong, K Han, K Lee, JH Cheon, and S Kim, BMC genomics, 20, 163-174 (2019).

TEACHING

Guest lecturer: Computer Convergence Application, 2022 Spring, Seoul National University

May 2, 2022

- “Dimensionality reduction: linear regression, lasso, PCA/ICA/CCA, and t-SNE”

PRESENTATIONS

2023 SNU Artificial Intelligence Institute Retreat

May 19, 2023

- “Dual representation learning for predicting drug-side effect frequency using protein target information”

AI for Drug Discovery Symposium, MOGAM Institute of Biomedical Research

Jun 27, 2022

- “BioVLAB-Cancer-Pharmacogenomics: Tumor heterogeneity and pharmacogenomics analysis of multi-omics data from tumor on the cloud”

The 6th SNU Bioinformatics Research Exchange Conference

Feb 16, 2022

- “Multi-omics integrative analysis pipelines of cancer pharmacogenomics”

ICGC ARGO 17th Scientific Workshop / 4th ARGO Meeting

May 14-15, 2021

- “BioVLAB-Cancer-Pharmacogenomics: Tumor heterogeneity and pharmacogenomics analysis of multi-omics data from tumor on the cloud”

The 17th Asia Pacific Bioinformatics Conference (APBC 2019)

Jan 14-16, 2019

- “A secure SNP panel scheme using homomorphically encrypted K-mers without SNP calling on the user side”

AWARDS & FELLOWSHIPS

2022 1H Talented Researcher Fellowship

Mar 25, 2022

BK21 FOUR Graduate School Innovation Project

2021 Star Student Researcher Award

Feb 23, 2022

BK21 FOUR Intelligence Computing

Standigm/Korean Society for Bioinformatics Best Paper Award

Oct 27, 2021

BIOINFO 2021, Korean Society for Bioinformatics

Second-tier Travel Fellowship

Jan 16, 2019

The 17th Asia Pacific Bioinformatics Conference