Myungsun Kang

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https://sunnnymskang.github.io/

Senior Data scientist, Ph.D. in statistical vaccine design

KEY QUALIFICATIONS

6 years of domain expertise in HIV vaccine science, developed probablistic programming algorithms at MIT, which led to publications of **2 joint first author articles in top peer-reviewed journals**

1.5 yrs of industry experience as Senior data scientist productionalizing machine learning pipeline end-to-end, developing new machine learning models and causal inference

Research scientist at Covid-19 tech consortium (PathCheck), developing neural networks for proximity sensing via Bluetooth signal

EDUCATION

2019   **Massachusetts Institute of Technology (MIT)**
Doctor of Philosophy candidate, Chemical Engineering, Institute for Medical Engineering & Science
(Minor: Statistics and Computer Science)
Master of Science in Chemical Engineering Practice, Chemical Engineering

2012   **Korea Advanced Institute of Science and Technology (KAIST)**
Bachelor of Science, Chemical Engineering, Minor: Biology, *summa cum laude*

SKILLS

' Technical expertise	Immunology, Vaccine design, Discrete stochastic simulation, Machine learning, Causal inference, NLP, Deep Learning, Exploratory statistics, Inferential statistics, Bayesian statistics
Programming Languages	Python, SQL, HIVE, C, Bash
Packages	SciPy, NumPy, Pandas, Seaborn, StochPy, pymc3, Pytorch, PySpark, Tensorflow, Keras, huggingface
Applications	Git (source control), Docker, Airflow, BigQuery, GCP
Languages	English and Korean (fluent)

EXPERIENCE

2019 Mar-   **Senior data scientist**, Wayfair, Algorithms and Analytics
- Developed a casual inference framework that evaluates the impact of Wayfair's new logistics program
- Productionalized an upgrade to a major machine learning pipeline that predicts Wayfair's profitability for about million orders per day
- Developed and productionalized a profitability model, which led to 65 percent improvement in error

2020 May-   **Research scientist**, PathCheck Foundation
- Developed 1D CNN that predicts the distance between two devices from bluetooth and other sensors
- Engineered uniform length feature set from 1000 time series stamps of Bluetooth signals and various sensors
- Developed three 1D CNN architectures of differing regularizations
- Took the third place in the competition held by NIST and submitted a paper to arXiv

2018 Sep-Nov   **Fellow**, Insight Data Science
- Built a web app that recommends anti-depressants pills tailored to patients' symptoms
- Extracted side effects from patient survey data using topic modeling, and infered their prevalence from the corpus of patient experience
- Engineered features from 17,000 subreddit comments collected through Pushshift Reddit API using NLP methods including TF-IDF, word2vec and sentiment analysis

	• Built a recommendation system that is trained on words associated with positive experiences for a given drug. Employed Logistic regression and linear SVC for the classification (F1 score: 0.74)
	• Built an inter-active user interface with Flask, Bootstrap and AWS
2012 -2019 Feb	**Ph.D. Candidate**, Chemical Engineering, MIT
	• Developed a simulation algorithm to predict immune response from HIV vaccine prototypes
	• Employed non-linear regression to built a time-dependent deterministic nonlinear differential equation model in Matlab, which can predict serum Ab production upon vaccination
	• Developed a probabilistic programming algorithm of Ab response by implementing Tau-leap gillespie algorithm with partial deterministic approximation, which led to 50X speed enhancement with <1 percent accuracy tradeoff
	• Simulated HIV vaccine prototypes and proposed prospective candidates, which is now being tested in non-human primates
2017 Sep-	**Affiliate**, Global Access in Action(GAiA), Berkman Klein Center, Harvard University
	• Drafted two policy briefs on strategies to increase access to medicines - Voluntary licensing and differential pricing, and research incentivization.
2017 Nov-Dec	**Consultant**, Human rights, law and treatment access, HIV, Health and Development Group, Bureau for Policy and Programme Support, United Nations Development Programme
	• Produced four deliverables assigned for the Global Commission on HIV and the Law.
	• Deliverables include: a desk review of the follow up activities to the recommendations of Global Commission on HIV and the Law (>300 pages document), a summary and map inforgraphics of the follow up activities, an analysis on the emerging issues and needs.
2017 Jul-Aug	**Intern**, Human rights, law and treatment access, HIV, Health and Development Group, Bureau for Policy and Programme Support, United Nations Development Programme
	• Supported the team with organizing three events convened during the 2017 High-Level Political Forum.
	• Drafted the Concept Note for a Member States Briefing on High-Level Panel on Access to Medicines.
	• Researched connection between access conditions of new treatments for HIV, TB and Hepatitis C and treatment coverage in 20 countries for UNITAID proposal.
	• Researched legality of sexual orientation and self expression in 61 countries for UK AID Connect Request for Proposals.
	• Researched multilateral involvement in quantifying LGBTQI inclusion.
	• Created a structured repository of follow up activities to the recommendations of Global Commission.

PUBLICATIONS

Google Scholar profile: https://scholar.google.com/citations?user=0R3DecUAAAAJ&hl=en

Sheshank Shankar[*], Ayush Chopra[*],Rishank Kanaparti[*], **Myungsun Kang**[*], Abhishek Singh, Ramesh Raskar, "Proximity Sensing for Contact Tracing", arXiv, 2020 Aug

Hok Hei Tam[*], Mariane B. Melo[*], **Myungsun Kang**[*], Jeisa M. Pelet, Vera M. Ruda, Maria H. Foley, Joyce K. Hu, Sudha Kumari, Jordan Crampton, Alexis D. Baldeon, Rogier W. Sanders, John P. Moore, Shane Crotty, Robert S. Langer, Daniel G. Anderson, Arup K. Chakraborty, Darrell J. Irvine, "Sustained antigen availability during Germinal Center initiation enhances antibody responses to vaccination", Proceedings of the National Academy of Sciences, 201606050 ([*]equal contributors) **101 accumulated citations to date**

Kang M, Eisen TJ, Eisen EA, Chakraborty AK, Eisen HN (2015), "Affinity inequality among serum antibodies that originate in lymphoid Germinal Centers", PLoS ONE 10 (10): e0139222. doi:10.1371/journal.pone.0139222 **11 accumulated citations to date**