Namshik **Kim**

Research Scientist · Data scientist based on deep learning and theoretical physics · PhD

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Summary

- Expertise in theoretical physics, numerical approximation, machine learning, and analytical problem solving
- Experience using deep learning techniques to develop AI-enabled mobile application features

Skills

Programming languages

- **Main** : Python and libraries including Keras, Tensorflow, Scikitlearn, Gym(openAI), Pandas, Numpy, Scipy, Matplotlib, PyPy, PILimage, Librosa (digitial process for musical signal), Deepdish (flexible data saving and loading for deep learning), BeatifulSoup.
- **Intermediate** : SQL
- **Basic** : C, Fortran, PHP, Spark (PySpark)

Software development skills and technologies

- Object-Orient design in Unix/Linux, AWS EC2, S3, Google Cloud Service, Docker (link) container with Google documents, Vim, VS code environment, Git, Github, Bitbucket, ssh

Models

- Deep learning : Supervised convolutional neural network (CNN), Unsupervised generative adversarial network (GAN), Deep reinforcement learning, Edge detection, LSTM/RNN
- Other machine learning : Clustering, Hopfield net, Ising model, Variational inference, Bayesian inference, Variational autoencoders, Markov chain Monte-Carlo methods, Regression, SVM
- Numerical methods for scientific research including to solve non-linear partial differential equations with Wolfram Mathematica, Matlab

Conferences

Holography 2013 (Link): Gauge/gravity duality and strongly correlated systems *Seoul, S.Korea*

Assistant Organizer and Presenter by Asia Pacific Center for Theoretical Physics *Jun 13 - 22, 2013*

- Facilitated the organization of the conference and led workshops
- Presented the string theory model introduced by <Holographic dynamical symmetry breaking of joined embedding>. About 70 theoretical physicists participated
- Published at Phys. Lett. B, <D7-anti-D7 bilayer: Holographic dynamical symmetry breaking>

Seminars as an Invited Speaker *Seoul, S.Korea*

Presentation at Center for Quantum Spacetime *Jul. 2014*

- Presented the string theory model introduced by <Holographic D3-probe-D5 Model of a Double Layer Dirac Semimetal>.
- Published at Journal of High Energy Physics.

Work and Research Experiences

Experience : Research scientist at Soundcorset, Oct. 2017 - Sep. 2018, Vancouver, Canada

- Developed a neural network model using **Keras, Tensorflow, Scikitlearn, Librosa** to evaluate the quality of musical performances and provide helpful feedback to musicians using the Soundcorset app, which is a high quality-tuner, metronome, recorder. The model's multi-class output determined instruments and musical categories, as well as provided quality ratings (good, medium, poor) in order to improve musician performance. This model enabled the development of successful AI-enabled features, improving the user experience and significantly contributed to the application upward adoption and popularity. Link
- Performed research into a cutting-edge Generative Adversarial Network (GAN)-based model using **Keras, Tensorflow, Scikitlearn, Librosa** to translate a musician's recording into other genres of music. Utilized the latest deep-learning research to develop network topology, as well as proper digital-signal preprocessing (music to image) and post-processing (image to music) methods (GAN/MUNIT).
- Successfully researched and communicated state-of-the-art GAN research to teammates and multiple business stakeholders at various levels of technical understanding.

Personal projects, Oct 2018 - present

- Developed an electrocardiogram (ECG) classification method using **Keras, Tensorflow, Scikitlearn** in order to identify different heart-beat patterns using convolutional neural networks (CNN). It performs better than human cardiologists. Model could be used to diagnose irregular heart-beat patterns in clinical patients. Deepened my understanding of CNNs and confirmed correctness of existing research (linked article on Nature) on a new dataset. Github repo link
- Developed novel saber-metric (baseball) model to determine baseball pitcher quality independent of team fielding and game-day conditions. Method significantly improves prediction accuracy compared to existing fielding independent pitching stats, linear regression-based methods. The model works to find undervalued pitchers and to make surplus. Developed a web crawler in Python using **Requests, BeautifulSoup** to scrape needed data and statistics. Github repo link
- Performed pedagogical reviews for deep learning models and problem solving for machine learning models including soft K-means, Hopfield net, Ising model, Variational inference, Bayesian inference, Variational autoencoders, Markov chain Monte-Carlo method, Regression, SVM. Blog link

Academy : PhD in Physics at University of British Columbia, Oct. 2011 - May 2017, Vancouver, BC, Canada

- Developed the highly complicated geometrical models to better understand the graphene model, which holds great promise for various material/device applications including flexible LCD screens.
- Built non-linear systematic models and tested numerically with Mathematica, Python, Matlab
- Published five scientific research papers in the Journal of of High Energy Physics, Physics Letter B. ResearchGate link

Education

University of British Columbia *Vancouver, BC, Canada*

PhD and MSc in Physics, String theory *May 2017*

- Thesis link : **<Holographic gauge/gravity duality and symmetry breaking in semimetals>**

Teaching and Other Activities

Teaching at University of British Columbia *2010 - 2016*

- Taught Electronics and Data Acquisition : Helped experiments and Python programming and troubleshooting, grading
- Taught quantitative physics : Mechanics, Statistical Mechanics, Mathematical Physic, General Physics, Thermal Physics

Other notable activities

- Military service : Observed and analyzed the weather for S. Korea Air Force
- Hobbies : Baseball, Biking, Cooking, Hand drip coffee, Water painting, traveling for eating and visiting an art gallery, Yahoo fantasy sports league