

JONG WOOK KIM

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Employment

Spotify USA, Inc.

New York, NY

RESEARCH SCIENTIST PHD INTERN

Jun 2018 - Aug 2018

- **Integrated CREPE pitch estimator based on convolutional neural networks** into a Docker-based distributed computing pipeline comprising a series of feature extraction stages, used for consumer analysis and music recommendation.
- **Developed a music synthesis algorithm with controllable timbre using WaveNet**, which enabled timbre morphing based on supplied MIDI files. A paper describing this work is accepted to the IEEE ICASSP 2019 conference.

Pandora Media, Inc.

Oakland, CA

RESEARCH SCIENTIST INTERN IN MUSIC INFORMATION RETRIEVAL

Jun 2017 - Aug 2017

- **Developed a music recommendation algorithm for modeling individual listeners' tastes**, based on embeddings obtained from user interaction data. The model was built in Apache Spark and was able to incorporate the multimodal tastes of the listeners and produce clusters of their favorite music genres, yet being efficient enough to be able to run on Pandora's entire user base within hours.

Kakao Corporation

Seongnam, Korea

RECOMMENDER SYSTEM ENGINEER & DATA SCIENTIST

Jun 2014 - Mar 2017

- **Developed Apache Spark applications for the company's recommender systems**, which were gradually being migrated from Apache Hive, and built a framework around Spark called CueSheet, which helps simplify the development cycle of Spark jobs by automating the application packaging while separating the concerns of implementation and configuration. The details on CueSheet such as its JVM dependency resolution mechanism were presented in Spark Summit East 2017 in Boston.
- **Developed a distributed API server in Scala that delivers personalized recommendations** in various domains, which were pre-computed and stored in the databases such as HBase and Couchbase. The deployment and scaling was managed using Marathon, and the system supported bucket testing for evaluating different recommendation algorithms on-line.
- **Designed and developed a distributed and fault-tolerant stream processing framework** built atop Apache Kafka, providing stream manipulation primitives such as filter, transformer and joiner for the modular implementation of streaming jobs. Joiner, in particular, leveraged in-memory data grids to combine two input streams which may have arbitrarily ordered data in real-time.
- **Participated in the development of the company-wide distributed graph database called S2Graph**, now an Apache Incubator project which I am a committer of. My contributions included build automation for publishing on Maven Central, logging, documentation, and an engine for a Scala-based domain specific language to be used for data analysis on the web console.
- **Made a core utility library in Scala** for the API servers and Spark applications being developed in the team, focusing on the simple and thread-safe usage. In addition to the basic IO and JSON conversion utilities, the library enabled easier nonblocking access to various endpoints that the team was using, including Elasticsearch, ZooKeeper, OpenTSDB, HBase, Couchbase, and HTTP servers.
- **Leveraged OpenTSDB and Grafana to record and visualize the real-time statistics** of the various kinds of applications running in the distributed architecture. Using ring buffers, the systems were able to publish real-time metrics without affecting the performance, and they were reflected in the report within seconds, helping quickly identify the trends as well as any unexpected behaviors.
- Built and maintained a Jenkins cluster that runs mission-critical Hadoop jobs for the company's recommender systems.

NCSOFT Corporation

Seoul & Seongnam, Korea

GAME SERVER PLATFORM DEVELOPER

Aug 2012 - Jun 2014

- **Designed and developed a distributed server platform for Lineage Eternal**, the company's upcoming massively multiplayer online role-playing game (MMORPG) which is now called Project TL. The platform was composed of a number of fault-tolerant clusters of Java and C++ servers, built using Netty/RxJava and Boost ASIO for the asynchronous and nonblocking IO. Its goal was to make the game playable without requiring the users to select and be limited to only one among many game servers.
- Built a cross-platform logging library in C++ that resembles SLF4j, to be used in Lineage Eternal's game servers.
- Managed the Perforce source control server, which had millions of files being shared among the team of 100+ members.

NCSOFT Corporation

Seoul, Korea

GAME DEVELOPER INTERN

May 2011 - Aug 2011

- Developed the pathfinding engine of Lineage Eternal, used in both the game client and server, built on top of Havok AI.

Education

New York University

PH.D. (ANTICIPATED IN 2019) IN MUSIC TECHNOLOGY

New York, NY

Sep 2011 - May 2012, Sep 2015 - Present

- Advised by Dr. Juan Pablo Bello, expected graduation in 2019. GPA 3.76/4.00
- Research interests include automatic music transcription using deep generative models and music recommendation.
- Relevant coursework: Probabilistic Graphical Models, Statistical Natural Language Processing, Convex Optimization, Deep Learning

University of Michigan

M.S. IN COMPUTER SCIENCE AND ENGINEERING

Ann Arbor, MI

Sep 2009 - Apr 2011

- Advised by Dr. Georg Essl, focusing on intelligent systems and interactive music environments. GPA 7.76/9.00
- Relevant coursework: Machine Learning, Information Theory, Advanced Compilers, Advanced Computer Network

Korea Advanced Institute of Science and Technology

B.S. IN ELECTRICAL ENGINEERING WITH A MINOR IN MATHEMATICAL SCIENCES

Daejeon, Korea

Sep 2006 - May 2009

- GPA 3.83/4.30, with 3.97/4.30 in electrical engineering and 4.03/4.30 in mathematical sciences.

Imperial College London

UNDERGRADUATE RESEARCH OPPORTUNITY PROGRAM IN THE DEPARTMENT OF MECHANICAL ENGINEERING

London, UK

Jul 2006

- Developed tools for preprocessing data to be used in finite element method software

Publications

Neural Music Synthesis for Flexible Timbre Control

J. W. KIM, R. BITTNER, A. KUMAR, J. P. BELLO, IN *Proceedings of IEEE ICASSP (in press)*

Jun 2019

Open Source Practices for Music Signal Processing Research

M. MCFEE, J. W. KIM, M. CARTWRIGHT, J. SALAMON, R. BITTNER, & J. P. BELLO, IN *IEEE SPM Special Issue on Music Signal Processing*

Jan 2019

CREPE: A Convolutional Representation for Pitch Estimation

J. W. KIM, J. SALAMON, P. LI & J. P. BELLO, IN *Proceedings of IEEE ICASSP*

Apr 2018

Fast Music and Audio Processing Using the Julia Language

J. W. KIM, S. RUSSELL, & J. P. BELLO, IN *Proceedings of the AES Conference on Semantic Audio*

June 2017

Concepts and Practical Considerations of Platform-Independent Design of Mobile Music Environments

J. W. KIM & G. ESSL, IN *Proceedings of the International Computer Music Conference*

Jul 2011

Presentations

No More “sbt assembly”: Rethinking spark-submit using CueSheet

SPARK SUMMIT EAST 2017

Boston, MA

Feb 2017

MusicProcessing.jl: Music Information Retrieval in Julia

JULIACON 2016

Cambridge, MA

Jun 2016

Building High Performance Servers with Rx and Functional Reactive Programming

NEXON DEVELOPER CONFERENCE 2014

Seongnam, Korea

May 2014

Honors & Awards

2010 **Samsung Scholarship** USD 50,000 per year, for 5 years of the Ph.D. program

2009 **Kwanjeong Scholarship** USD 50,000 per year, for 2 years of the M.S. program

Skills

Programming Contributed to TensorFlow, Apache S2Graph, Hazelcast, LightFM, and other open source projects
Scala, Python, Java, C/C++ professionally, and Julia, ObjC, PHP, JS, TS, Matlab for personal/research projects

Languages English, Korean, Japanese