Himchan Park
Ph.D.

Personal Information

Date of Birth	Nov. 3, 1989
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Education

3/2013 – 2019/8 **Daegu Gyeongbuk Institute of Science and Technology (DGIST)**
MS/Ph.D. in Information and Communication Engineering (Advisor: Prof. Min-Soo Kim)

3/2008 – 2/2013 **Korea Advanced Institute of Science and Technology (KAIST)**
B.S. in Computer Science

Positions and Appointments

9/2019 – present **Daegu Gyeongbuk Institute of Science and Technology (DGIST), Korea**
Postdoctoral Fellow, InfoLab, Department of Information and Communication Engineering   (Advisor: Prof. Min-Soo Kim)

Awards and Honors

[1] Invited presentation, "EvoGraph: An Effective and Efficient Graph UpscalingMethod for Preserving Graph Properties," *Korea Software Congress*, Dec. 2018.

[2] KDD Travel Award, *KDD* 2018, London, United Kingdom, Aug. 2018.

[3] Wook Hyun Kwon Outstanding Researcher Award, Daegu Gyeongbuk Institute of Science and Technology, Feb. 2018.

[4] Outstanding Researcher Award, Daegu Gyeongbuk Institute of Science and Technology, Dec. 2017.

[5] Invited presentation, "TrillionG: A Trillion-scale Synthetic Graph Generator using a Recursive Vector Model," *Korea Computer Congress*, June. 2017.

[6] SIGMOD Travel Award, *SIGMOD* 2017 Chicago, IL, USA, May 2017.

Projects

9/2019-present	**Title: Extreme Exploitation of Dark Data** Daegu Gyeongbuk Institute of Science and Technology (DGIST), Korea In this project, I have proposed a high-performance blockchain system for processing massive transactions of smart contract. It offers a hybrid approach between two extremes, ordering-execution systems (e.g., Bitcoin) and execution-ordering systems (e.g., IBM HyperLedger Fabric) by depending on power-law distribution of transactions under the background of graph theory. It can successfully process large amount of transactions with minimizing failures for processing transactions unlike HyperLedger Fabric, and at the same time, improve both throughput and latency for processing transactions rather than Bitcoin-like systems. This work is currently under development.
12/2015– 11/2018	**Title: BigLearning: A Large-scale Optimization System of Deep Neural Network Models** Samsung Research Funding Center, Samsung Electronics, Korea In this project, I have proposed a real graph up-scaling method called EvoGraph. It can upscale the original small real graph with preserving its properties regardless of a scale factor. It can upscale the Yahoo web graph with the scale factor 128 (about 0.9 trillion edges) within 16.2 hours including disk I/O. It also can be used for generating a trillion-scale deep neural network architecture based on well-known deep neural networks.
6/2014– 5/2018	**Title: From Facebook to Brain Networks: Trillion-scale Big Graph Processing Engine** Samsung Research Funding Center, Samsung Electronics, Korea In this project, I have proposed a trillion-scale synthetic graph generator called TrillionG and participated in a GPU-based graph processing engine called GTS. TrillionG can generate massive graphs in a short time only using a small amount of memory. TrillionG can generate a graph of trillion edges following the RMAT or Kronecker models within two hours only using 10 PCs, which outperforms the state-of-the-art by orders of magnitude. GTS is a fast and scalable graph processing method that can handles even 64 billion edges very efficiently only by using a single machine. GTS stores graphs in PCI-E SSDs and executes a graph algorithm using thousands of GPU cores while streaming topology data of graphs to GPUs via PCI-E interface.

5/2014-4/2017	Title: **Efficient Computing Connected Components using SSD for Big Graphs**
	National Research Foundation of Korea(NRF), Ministry of Science, Korea
	In this project, I have participated in DSP-CC to conduct the experiments for comparing the proposed method DSP-CC to a lot of other distributed frameworks. DSP-CC is an I/O efficient parallel algorithm for billion-scale graphs in a single PC. DSP-CC exploit sequential disk access in terms of disk I/O and parallel processing in terms of computation, and as a result, significantly outperforms the state-of-the-art.

Publications

International Conferences

[1] **Park, H.** and Kim, M.-S., "EvoGraph: An Effective and Efficient Graph Upscaling Method for Preserving Graph Properties," *In Proc. 2018 ACM SIGKDD*, London, United Kingdom, August 19-23, 2018 (long presentation).

[2] **Park, H.** and Kim, M.-S., "TrillionG: A Trillion-scale Synthetic Graph Generator using a Recursive Vector," *In Proc. 2017 ACM SIGMOD*, Chicago, USA, May 14-19, 2017.

[3] Kim, M.-S., An, K.-H., **Park, H.**, Seo, H., and Kim, J., "GTS: A Fast and Scalable Graph Processing Method based on Streaming Topology to GPUs," *In Proc. 2016 ACM SIGMOD*, San Francisco, USA, June 28, 2016.

[4] Kim, M.-S., Lee, S., Han, W.-S., **Park, H.**, and Lee, J.-H., "DSP-CC: I/O Efficient Parallel Computation of Connected Components in Billion-scale Networks," *In Proc. 32nd IEEE International Conference on Data Engineering (ICDE),* Helsinki, Finland, May 17, 2016.

International Journals

[5] Kim, M.-S., Lee, S., Han, W.-S., **Park, H.,** and Lee, J.-H., "DSP-CC: I/O Efficient Parallel Computation of Connected Components in Billion-scale Networks," *IEEE Transactions on Knowledge and Data Engineering (TKDE)*, Vol. 27, No. 10, pp. 2658-2671, 2015 (ISSN: 1041-4347,SCI).

Under review or preparation

[6] **Park, H.**, Xiong, J., and Kim, M.-S., "T-GPS: Trillion-scale Graph Processing Simulator on a Single Machine," *under review* (submitted to SIGMOD 2020).

[7]   **Park, H.**, and Kim, M.-S., "TrillionBA: A Trillion-scale Barabási–Albert Synthetic Graph Generator," *will be submitted soon* (in preparation for KDD 2020).

Patents

[1]   **Park, H.** and Kim, M.-S., "A graph upscaling method for preserving graph properties and operating method thereof," Korean Patent, Appl. No. 10-2018-0097551, Aug. 21, 2019; U.S. Patent Appl. No. 16-541628, Aug. 15, 2019.

[2]   **Park, H.** and Kim, M.-S., "A trillion-scale synthetic graph generator and operating method thereof," Korean Patent, Appl. No. 10-2018-0029111, Mar. 13, 2018; U.S. Patent Appl. No. 15-955914, Apr. 18, 2018.

[3]   Kim, M.-S., An, K., **Park, H.**, Oh, S., Kim, J., "Processing system for graphs and operating method thereof," Korean Patent, Appl. No. 10-2019-7022145, July 26, 2019; U.S. Patent Appl. No. 15-556411, Sept. 7, 2017.

[4]   Kim, M.-S., and **Park, H.**, "Method for processing connected components graph interrogation based on disk," Korean Patent, Appl. Np. 10-2015-0050350, Apr. 9, 2015.