Charmgil Hong

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INTERESTS

- Developing and applying machine learning/data mining techniques to address large and complex data-driven problems
- Implementing domain-independent software tools for data analysis, extraction, predictive modeling, and their utilization

EDUCATION

Ph.D. in Computer Science — GPA: 3.92/4.0 2017
- Thesis: *Multivariate Data Modeling and Its Applications to Conditional Outlier Detection*
Advisor: Dr. Milos Hauskrecht
University of Pittsburgh, Pittsburgh, PA, USA

B.S.E. in Computer Science and Electronic Engineering (with Distinction) — GPA: 4.12/4.5 2010
Handong Global University, Pohang, Gyeongbuk, Korea

Global Engineering Education Exchange Student — GPA: 4.0/4.0 2008
University of Pittsburgh, Pittsburgh, PA, USA

EXPERIENCES

Postdoctoral Associate Oct 2017 - Sept 2018
Department of Computer Science, University of Pittsburgh, Pittsburgh, PA, USA
- Conduct predictive data modeling and outlier detection to prevent medical/clinical errors
- Analyze electronic health records (EHRs) and develop machine learning methodologies
Supervisor: Dr. Milos Hauskrecht

Graduate Student Researcher May 2011 - Aug 2017
Department of Computer Science, University of Pittsburgh, Pittsburgh, PA, USA
- Primary focus: Multi-Label Classification that aims to learn and predict multi-dimensional output (multiple class labels or decision; Conditional Outlier Detection for clinical applications that monitor and alert on medical errors
- Analyzed and processed the electronic health records that University of Pittsburgh Medical Center (UPMC) maintains; Developed a number of software packages that help data preprocessing, feature generation for predictive modeling, outlier detection and alerting

Research Intern May 2015 - Aug 2015
Siemens Corporate Technology, Princeton, NJ, USA
- Topic: Sensory data analysis and multi-target regression for effective facility maintenance (Mentor: Dr. Dmitriy Fradkin)
- Developed a structured prediction framework to address the gas turbine monitoring and reliability prediction problem

Research Intern May 2014 - Aug 2014
Bosch Research and Technology Center North America, Palo Alto, CA, USA
- Topic: Cost-sensitive decision-theoretic classification/rule mining for automated identification of scraps from manufacturing processes (Mentor: Dr. Rumi Ghosh)
- Implemented a software package that supports decision making in class-imbalance and cost-sensitive scenario

Researcher/Research Administrator Dec 2009 - Jul 2010

Research Collaboration Center for Green and Appropriate Technology, Handong Global University, Korea

- Planned and proposed strategies and methods for Official Development Assistance (ODA) to the Korean Government
- Organized and administered international development/technical research projects that were funded by the *Korean Ministry of Education, Science and Technology* and the *UNESCO UNITWIN Programme*

Military Service: Information Management Officer (IMO) May 2004 - May 2006

Sergeant, Korean Augmentation Troops to the United States Army / 41st Battalion, 1st Signal Brigade, 8th US Army

- Administered the 8th US Army Area 1 Active Directory; Maintained the Army networks and communication devices
- Recognitions: Army Commendation Medal (May 2006), Army Achievement Medal (Jun 2005)

REFEREED PUBLICATIONS

C. Hong, D. Fradkin, and A. Chakraborty. *"A Structured Prediction Framework for Multi-target Regression." (preprint)*.

I. Batal, **C. Hong**, and M. Hauskrecht. *"Multi-label Classification by Learning Tree Conditional Random Fields." (preprint)*.

C. Hong and M. Hauskrecht. *"Multivariate Conditional Outlier Detection: Identifying Unusual Input-Output Associations in Data."* International FLAIRS Conference, Melbourne, FL, USA, 2018.

C. Hong, S. Liu, and M. Hauskrecht. *"Detection of Unusual Input-Output Associations."* SIAM Workshop on Dimension Reduction, Pittsburgh, PA, USA, 2017.

M. Hauskrecht, I. Batal, **C. Hong**, Q. Nguyen, G. F. Cooper, S. Visweswaran, and G. Clermont. *"Outlier-based detection of unusual patient-management actions: An ICU study."* Journal of Biomedical Informatics 64: 211-221, 2016.

C. Hong, R. Ghosh, and S. Srinivasan. *"Dealing with Class Imbalance Using Thresholding."* ACM SIGKDD Workshop on Outlier Definition, Detection, and Description on Demand (ODD 4.0), San Francisco, CA, USA, 2016.

C. Hong and M. Hauskrecht. *"Multivariate Conditional Outlier Detection and Its Clinical Application."* AAAI Conference on Artificial Intelligence (Abstract), Phoenix, AZ, USA, 2016.

C. Hong, I. Batal, and M. Hauskrecht. *"A Generalized Mixture Framework for Multi-label Classification."* SIAM International Conference on Data Mining (SDM), Vancouver, BC, Canada, 2015.

C. Hong and M. Hauskrecht. *"Multivariate Conditional Anomaly Detection and Its Clinical Application."* AAAI Conference on Artificial Intelligence (Abstract), Austin, TX, USA, 2015.

C. Hong, I. Batal, and M. Hauskrecht. *"A Mixtures-of-Trees Framework for Multi-Label Classification."* ACM Conference of Information and Knowledge Management (CIKM), Shanghai, China, 2014.

M. Pakdaman, I. Batal, Z. Liu, **C. Hong**, and M. Hauskrecht. *"An Optimization-based Framework to Learn Conditional Random Fields for Multi-label Classification."* SIAM International Conference on Data Mining (SDM), Philadelphia, PA, USA, 2014.

I. Batal, **C. Hong**, and M. Hauskrecht. *"An Efficient Probabilistic Framework for Multi-Dimensional Classification."* ACM Conference of Information and Knowledge Management (CIKM), Burlingame, CA, USA, 2013.

C. Hong and M. Hauskrecht. *"Analysis of Temporal Clinical Patterns Using Hidden Markov Models."* International Conference on Machine Learning (ICML) Workshop on Clinical Data Analysis, Edinburgh, Scotland, UK, 2012.

PATENTS / INVENTION DISCLOSURES

R. Ghosh, **C. Hong**, and S. Srinivasan. *"Value Addition Dependent Data Mining Techniques for Assembly Lines."* US Patent Application No. 15/342,677.

C. Hong, D. Fradkin, and A. Chakraborty. *"Multi-Target Regression Using Canonical Correlation Analysis."* Invention disclosure No. 2015E16593US, Siemens.

HONORS / AWARDS

Travel Grant, *Graduate and Professional Student Government, University of Pittsburgh*	2016
1st Prize, Research Competition (Area: Artificial Intelligence), *University of Pittsburgh*	2015
Doctoral Consortium Scholarship, *Association for the Advancement of Artificial Intelligence*	2015
Travel Grant, *Dietrich School of Arts and Science, University of Pittsburgh*	2015 - 2016
Travel Grant, *Society for Industrial and Applied Mathematics*	2015
Travel Grant, *Department of Computer Science, University of Pittsburgh*	2012 - 2016
Travel Grant, *National Science Foundation*	2012, 2015
1st Prize, *Engineering Design for the Other 90%, Sharing and Technology Inc.*	2009
Global Engineering Education Exchange Student Scholarship, *Institute of International Education*	2007 - 2008
Merit-Based Scholarship, *Korean Ministry of Education, Science and Technology*	2007, 2009
Merit-Based Scholarship, *Handong Global University*	2002 - 2003

PRESENTATIONS

Multivariate Data Modeling and Its Applications to Conditional Outlier Detection — Aug 2017
Department of Computer Science, University of Pittsburgh, Pittsburgh, PA, USA

Detection of Unusual Input-Output Associations (Poster) — Jul 2017
SIAM Workshop on Dimension Reduction, Pittsburgh, PA, USA

Improving Multi-label Classification Accuracy Using a Generalized Mixture Framework (Poster) — Mar 2017
Advancing Research through Computing (ARC) 2017, Pittsburgh, PA, USA

Multivariate Conditional Anomaly Detection and Its Clinical Application (Poster) — Feb 2016
Association for the Advancement of Artificial Intelligence (AAAI) Student Abstract 2016, Phoenix, AZ, USA

Detection of Unusual Input-Output Patterns in Electronic Health Records (Poster) — Aug 2015
NSF Data Science Workshop, Seattle, WA, USA

Multi-Target Prediction — Jul 2015
Siemens Corporate Technology, Princeton, NJ, USA

A Generalized Mixture Framework for Multi-label Classification — Apr 2015
SIAM International Conference on Data Mining (SDM), Vancouver, BC, Canada

Multivariate Conditional Outlier Detection (Poster) — Apr 2015
SIAM International Conference on Data Mining (SDM) Doctoral Forum, Vancouver, BC, Canada

Multivariate Conditional Outlier Detection in Clinical Domain — Mar 2015
Annual Computer Science Day 2015, University of Pittsburgh, Pittsburgh, PA, USA

Multivariate Conditional Anomaly Detection and Its Clinical Application — Jan 2015
Association for the Advancement of Artificial Intelligence (AAAI) Doctoral Consortium 2015, Austin, TX, USA

Multi-label Classification — Nov 2014
Department of Computer Science, University of Pittsburgh, Pittsburgh, PA, USA

Building Decision Theoretic Classifiers for Imbalanced Datasets — Aug 2014
Bosch Research and Technology Center North America, Palo Alto, CA, USA

Multi-Dimensional Classification with Conditional Tree-structured Bayesian Networks — Mar 2014
Dietrich School of Arts and Sciences Grad Expo 2014, Pittsburgh, PA, USA

Multi-Label Classification with Conditional Tree-structured Bayesian Networks (Poster) — Jan 2014
Google Regional PhD Summit 2014, Pittsburgh, PA, USA

An Efficient Probabilistic Framework for Multi-dimensional Classification — Oct 2013
ACM Conference of Information and Knowledge Management (CIKM) 2013, Burlingame, CA, USA

Classification of Temporal Clinical Patterns Using Hidden Markov Models (Poster Presentation) Mar 2013
Google Regional PhD Summit 2013, Pittsburgh, PA, USA

Analysis of Temporal Clinical Patterns Using Hidden Markov Models (Poster Presentation) Jun 2012
ICML Workshop on Clinical Data Analysis, Edinburgh, Scotland, UK

TEACHING EXPERIENCES

Teaching Assistant, *Department of Computer Science, University of Pittsburgh, Pittsburgh, PA, USA*

- CS2750 Machine Learning
- CS2710 Foundations of Artificial Intelligence
- CS1571 Introduction to Artificial Intelligence
- CS1502 Formal Methods in Computer Science
- CS1501 Algorithm Implementation
- CS401 Intermediate Programming Using Java

VOLUNTEERING / EXTRACURRICULAR ACTIVITY

Reviewer, *International Joint Conference on Artificial Intelligence (IJCAI)*	2018
Reviewer, *AAAI Conference on Artificial Intelligence (AAAI)*	2016-2018
Reviewer, *IEEE Transactions on Knowledge and Data Engineering (TKDE)*	2014-2016
Reviewer, *IEEE Transactions on Big Data (TBD)*	2016
Reviewer, *Journal of Biomedical Informatics (JBI)*	2015
Reviewer, *Pattern Recognition Letters (PRLETTERS)*	2015
Reviewer, *Conference on Artificial Intelligence in Medicine (AIME)*	2015
Student Volunteer, *International Conference on Machine Learning (ICML), Edinburgh, Scotland, UK*	2012
Workshop Director, *Engineering Design with the Other 90% (D90), Wonju, Korea*	2010
Member, *SLE - Computer Science Student Society, Handong Global University, Pohang, Korea*	2002 - 2010
- **Volunteer Instructor** (System Programming, Server Administration)	2003, 2007, 2009
- **Chair**	2003
Illegal Internet Information Surveillance Team, *Pohang Police Agency, Pohang, Korea*	2007
Academic Affairs Coordinator, *Computer Science Student Association, Handong Global University*	2007

TECHNICAL PROFICIENCIES

Platforms: Linux, MacOS, Windows
Languages: Java, Matlab, Python, C/C++, R, Shell script
Database: MySQL, Oracle, SQLite