

# Seojin Bang

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## EDUCATION

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08/2015	<b>School of Computer Science, Carnegie Mellon University</b>	
– 08/2020	PhD in Computational Biology	Advisor: Wei Wu
03/2011	<b>Seoul National University, Korea</b>	
– 02/2013	MS in Statistics	
03/2006	<b>Sungkyunkwan University, Korea</b>	
– 08/2010	BS in Mathematical Education · BE in Statistics (double major)	

## WORKING EXPERIENCE

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Sep 2020 – Mar 2022	<b>Applied Scientist in ML</b> <i>Amazon.com, Inc., Seattle, WA</i>
Jan 2016 – Aug 2020	<b>Research Assistant</b> <i>Carnegie Mellon University, Pittsburgh, PA</i>
May 2018 – Dec 2018	<b>Research Intern</b> in Artificial Intelligence and Machine Learning Solution Team <i>Petuum, Pittsburgh, PA</i>
Aug 2013 – Aug 2015	<b>Research Assistant</b> <i>Department of Statistics, University of Connecticut, Storrs, CT</i>
Aug 2011 – Feb 2013	<b>Research Assistant</b> <i>Department of Statistics, Seoul National University, Korea</i>

## PUBLICATIONS

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- [1] **Atm-tcr: Tcr-epitope binding affinity prediction using multi-head self-attention model.**  
*Frontiers in Immunology*, 2022.  
Cai, Michael and **Bang, Seojin** and Zhang, Pengfei and Lee, Heewook.
- [2] **Explaining a black-box using deep variational information bottleneck approach.**  
*AAAI (The Thirty-Fifth AAAI Conference on Artificial Intelligence)*, 2021.  
**Bang, Seojin** and Xie, Pengtao and Lee, Heewook and Wu, Wei and Xing, Eric.
- [3] **Tcr-epitope binding affinity prediction using multi-head self-attention model.**  
*ICML WCB (The 2021 ICML Workshop on Computational Biology)*, 2021.  
Cai, Michael and **Bang, Seojin** and Lee, Heewook.
- [4] **Classifying argumentative relations using logical mechanisms and argumentation schemes.**  
*TACL (Transactions of the Association for Computational Linguistics)*, 2021.  
Jo, Yohan and **Bang, Seojin** and Reed, Chris and Hovy, Eduard.
- [5] **Kw-attn: Knowledge infused attention for accurate and interpretable text classification.**  
*NAACL DeeLIO (The 2nd Workshop on Knowledge Extraction and Integration for Deep Learning Architectures)*, 2021.  
Jang, Hyeju and **Bang, Seojin** and Xiao, Wen and Carenini, Giuseppe and Ng, Raymond and Lee, Young ji.
- [6] **A mixture model to detect edges in sparse co-expression graphs with an application for comparing breast cancer subtypes.**  
*PLOS ONE, Highlighted Articles*, 2021.  
Bar, Haim and **Bang, Seojin**.

- [7] **Detecting attackable sentences in arguments.**  
*EMNLP (Proceedings of the 2020 Conference on Empirical Methods in Natural Language Processing)*, 2020.  
 Jo, Yohan and **Bang, Seojin** and Manzoor, Emaad and Hovy, Eduard and Reed, Chris.
- [8] **Identification of epitope-tcr binding using a generative adversarial network model.**  
*ICML WCB (The 2020 ICML Workshop on Computational Biology)*, 2020.  
**Bang, Seojin** and Lee, Heewook.
- [9] **Dropout prediction over weeks in moocs via interpretable multi-layer representation learning.**  
*AAAI AI4EDU (Workshop on Artificial Intelligence for Education)*, 2020.  
 Jeon, Byungsoo\* and Park, Namyoung\* and **Bang, Seojin\* (co-first)**.
- [10] **Phased-lstm based predictive model for ehra with complex missing patterns.**  
*preprint, <https://www.cs.cmu.edu/~epxing/Class/10708-17/project-reports/project8.pdf>*, 2019.  
**Bang, Seojin** and Yang, Yang and Wang, Yuchuan.
- [11] **Multiview cluster analysis identifies variable corticosteroid response phenotypes in severe asthma.**  
*AJRCCM (American Journal of Respiratory and Critical Care Medicine)*, IF 16.49, **Highlighted Articles**, 2019.  
 Wu\*, Wei and **Bang\* (co-first)**, **Seojin** and Bleeker, Eugene and Castro, Mario and Denlinger, Loren and Erzurum, Serpil and Fahy, John and Fitzpatrick, Anne and Gaston, Ben and Hastie, Annette and Israel, Elliot and Jarjour, Nizar and Kerr, Sheena and Levy, Bruce Meyers, Deborah and Moore, Wendy and Peters, Michael and Phipatanakul, Wanda and Sorkness, Ronald and Wenzel, Sally.
- [12] **Robust multiple kernel k-means clustering using min-max optimization.**  
*preprint arXiv:1803.02458, submitted*, 2020.  
**Bang, Seojin** and Yu, Yaoliang and Wu, Wei.
- [13] **Phosphoproteomic analysis of the amygdala response to adolescent glucocorticoid exposure reveals g-protein coupled receptor kinase 2 as a target for reducing motivation for alcohol.**  
*Proteomes*, 6(4), 2018.  
 Bertholomey, Megan L. and Stone, Kathryn and Lam, TuKiet T. and **Bang, Seojin** and Wu, Wei and Nairn, Angus C. and Taylor, Jane R. and Torregrossa, Mary M.
- [14] **Naïve bayes ensemble: A new approach to classifying unlabeled multi-class asthma subjects.**  
*BIBM (2016 IEEE International Conference on Bioinformatics and Biomedicine)*, 2016.  
**Bang, Seojin** and Wu, Wei.
- [15] **Joint selection of snps for improving prediction in genome-wide association studies.**  
*BIBMW (2012 IEEE International Conference on Bioinformatics and Biomedicine Workshops)*, 2012.  
**Bang, Seojin** and Kim, Yong-Gang and Park, Taesung.
- [16] **Ethnic variability in the allelic distribution of pharmacogenes between korean and other populations.**  
*Pharmacogenetics and genomics*, 22(12), 2012.  
 Kim, In-Wha and Im Kim, Kyung and Chang, Hyeu-jin and Yeon, Bora and **Bang, Seojin** and Park, Taesung and Kwon, Ji-sun and Kim, Sangsoo and Oh, Jung Mi.

## RESEARCH EXPERIENCE

### ML for Fraud and Anomaly Detection

*Applied Scientist*

· Blinded

2020 – 2021

*Amazon*

### Interpretable ML

*Research Intern and Assistant*

2018 – 2020

*AI/ML Solution Team at Petuum, and Carnegie Mellon University*

- Developed a system-agnostic interpretable ML approach using neural networks using information bottleneck principle.
- Improved an out-of-sample prediction of epitope-TCR binding using an interpretable model.
- Softwares: VIBI ([github.com/SeojinBang/VIBI](https://github.com/SeojinBang/VIBI)) and TCR ([github.com/SeojinBang/TCR](https://github.com/SeojinBang/TCR))
- Three papers published in **AAAI** and **ICML-WCB**.

## ML for NLP problems

2018 – 2020

*Graduate Student*

*Carnegie Mellon University*

- Developed an ontology-based neural network model for patient need detection from an online ovarian cancer discussion forum.
- Analyzed to detect attackable sentences in arguments for successful persuasion using online discussions from the Change-MyView (CMV) subreddit.
- Three papers published in **TACL**, **EMNLP**, and **NAACL DeeLIO**.

## Multimodal/Multiview ML for Asthma Subtype Identification

2015 – 2020

*Research Assistant*

*Carnegie Mellon University*

- Developed a robust multiple kernel clustering approach.
- Identified asthma subtypes showing differential responses to corticosteroid by combining multiview clinical data.
- R-package: **MKKC** ([github.com/SeojinBang/MKKC](https://github.com/SeojinBang/MKKC))
- Three papers published in **AJRCCM**, **IEEE BIBM** and **Proteomes**.

## Interpretability and Robustness in ML

2019

*Visiting Graduate Student*

*ML Group at University of Cambridge, UK*

- Investigated the relationship between interpretability and robustness of machine learning and deep learning models.
- Developed a knowledge guided interpretable ML model using the posterior regularization.

## Statistical Modeling of Sparse Gene Networks

2013 – 2015

*Research Assistant*

*University of Connecticut, Storrs, CT, USA*

- Developed a statistical mixture model for better estimating sparse gene network.
- R-package: **edgefinder**
- A paper published in **PLOS ONE Highlighted Articles**.

## Statistical Approaches for Biomedical Problems

2012 – 2013

*Research Assistant and Scientist*

*Seoul National University, Korea*

- Developed a joint feature selection method using the elastic-net regularization to high-dimensional data.
- Deployed a time-dependent survival model to identify subtypes of intraductal papillary mucinous neoplasm.
- Two papers published in **IEEE BIBM** and **Pharmacogenetics and genomics**.

## PROFESSIONAL SERVICE

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2022	<b>Reviewer</b> , <i>NeurIPS, ICML, ICLR</i>
2021	<b>Program Committee</b> , <i>NeurIPS XAI4Debugging</i>
2021	<b>Reviewer</b> , <i>NeurIPS, ICLR, NAACL-HLT, ACL-IJCNLP, ACM CHIL</i>
2020	<b>Reviewer</b> , <i>NeurIPS, NeurIPS ML4H Workshop, ACM CHIL, ISMB</i>
2019	<b>Reviewer</b> , <i>NeurIPS ML4H Workshop, IEEE Access, IEEE TNNLS</i>
2018	<b>Reviewer</b> , <i>ACM BCB</i>
2018	<b>Admission Committee</b> , <i>Computational Biology Department, Carnegie Mellon University</i>
2011-2012	<b>Program Committee</b> , <i>International Symposium on Statistical Genetics, Microarray Analysis Workshop: Statistical Analysis using R language, The Spring Conference of the Korean Statistical Society</i>

## HONORS AND AWARDS

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2018	The Center for Machine Learning and Health Fellowships in Digital Health
2013	The Korean Statistical Society Paper Awards (3rd Place)

2012	The Korean Statistical Society Poster Awards (1st Place)
2006 – 2010	National Science and Engineering Undergraduate Scholarship

## TECHNICAL STRENGTHS

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<b>Major Language</b>	<b>Python, R, C/C++</b>
<b>Library &amp; Others</b>	Pytorch, Tensorflow, Keras, Git