

# Juhyun ‘Simon’ Park

<https://parksimon0808.github.io/>

juhyunp at princeton.edu

<b>Education</b>	<b>Princeton University</b> A.B. in Mathematics, Department GPA 3.97/4.0 Certificates: Applications of Computing, Statistics and ML (Leave of Absence for Military Service)	<i>Princeton, NJ, USA</i> <i>Sep 2017 - May 2019</i>  <i>(2019 - 2021)</i>
<b>Interests</b>	Machine Learning Theory, Deep Learning Theory, Optimization, Natural Language Processing	
<b>Research Experience</b>	<b>Machine Learning Theory</b> 1. Effect of L2 Regularization on ReLU Networks <span style="float: right;">Current</span> <i>Advisor: Boris Hanin</i> <ul style="list-style-type: none"><li>• Will analyze how L2 regularization on infinite-width, 1-layer networks restricts the function space for 2-dimensional data</li><li>• Will provide more insight into what it means to minimize total deviation norm of the gradient of a function on high dimensional input</li></ul> 2. Robustness of Shapley Values for Data Valuation <span style="float: right;">Spring 2021</span> <i>Advisor: Sanjeev Arora</i> <ul style="list-style-type: none"><li>• Analyzed the robustness of Shapley values across different training settings</li><li>• Proposed a novel approach of approximating Shapley values by evaluating on simpler models with similarly expressive power</li></ul> <b>Natural Language Processing</b> 1. Effectiveness of In-Context Learning <span style="float: right;">Current</span> <i>Advisor: Danqi Chen</i> <ul style="list-style-type: none"><li>• Will empirically analyze what aspects of in-context learning contribute to open-domain QA and summarization tasks</li><li>• Will shuffle gold answers, extract random sentences from contexts, select random English words with the same semantic meaning, etc.</li></ul> 2. Joint Multi-task Language Model <span style="float: right;">Spring 2021</span> <i>Advisor: Karthik Narasimhan</i> <ul style="list-style-type: none"><li>• Proposed a variation of a joint multi-task language model for Vietnamese that outperforms the baseline model</li></ul> <b>Theoretical Computer Science</b> 1. General Matroid Secretary Problem <span style="float: right;">Spring 2021</span> <i>Advisor: Matt Weinberg</i> <ul style="list-style-type: none"><li>• Proposed multiple algorithms for the Matroid Secretary Problem generalized from the ordinary Secretary Problem</li><li>• Proved their properties using the greedy algorithm and forbidden set frameworks</li></ul> 2. Free-Order Matroid Secretary Problem <span style="float: right;">Fall 2021</span> <i>Advisor: Matt Weinberg</i> <ul style="list-style-type: none"><li>• Proposed a variation to an algorithm with a competitive ratio of 4</li><li>• For uniform matroids, proved that the variation has a constant competitive ratio; conjectured that the ratio converges to <math>e</math> if the size of the matroid tends to infinity</li><li>• For general matroids, empirically observed that the algorithm is likely to have a competitive ratio close to <math>e</math></li></ul> 3. Applications of Polynomial Methods <span style="float: right;">Fall 2021</span> <i>Advisor: Alan Chang</i> <ul style="list-style-type: none"><li>• Studied how polynomial methods can be applied to Joints and Nikodym Problems</li></ul>	

	<b>Transportation Research and Urban Engineering Lab</b> <span style="float: right;">KAIST</span> <i>Advisor: Yoonjin Yoon (Department of Civil and Environmental Engineering)</i>	
	1. Resiliency of East Asian Air Network to Adversarial Attacks <span style="float: right;">Summer 2019</span>	<ul style="list-style-type: none"> <li>Through simulations, presented that the East Asian air network is more robust to adversarial attacks than the global network</li> </ul>
	2. Prediction of Seoul Metro Ridership <span style="float: right;">Summer 2019</span>	<ul style="list-style-type: none"> <li>Designed a LSTM model to predict the hourly ridership of Seoul metro</li> </ul>
<b>Publication</b>	Arora, S., <b>Park, S.</b> , Jacob, D., and Chen, D., "Introduction to Machine Learning: Lecture Notes for COS324 at Princeton University," 2022. <a href="#">[link]</a> <b>Park, S.</b> , "Extension of Simple Algorithms to the Matroid Secretary Problem," 2022. <a href="#">[link]</a>	
<b>Awards</b>	<b>Shapiro Award for Academic Excellence</b> <span style="float: right;"><i>Sep 2019</i></span> Princeton University, Top 3% of Class <b>Hanseong Sonjaehan Scholarship Foundation</b> <span style="float: right;"><i>Aug 2015</i></span> Top 150 in Republic of Korea	
<b>Teaching Experience</b>	<b>Introduction to Machine Learning</b> Undergraduate TA <span style="float: right;"><i>Current</i></span> <b>LaTeX Trainer</b> Lab TA <span style="float: right;"><i>Current</i></span> <b>Introduction to Programming Systems</b> Lab TA <span style="float: right;"><i>Spring 2021, Current</i></span> <b>Algorithms and Data Structures</b> Lab TA <span style="float: right;"><i>Spring 2021, Current</i></span> <b>Algorithms and Data Structures</b> Grader <span style="float: right;"><i>Spring 2019, Fall 2021</i></span> <b>Computer Science: An Interdisciplinary Approach</b> Grader <span style="float: right;"><i>Fall 2018</i></span>	
<b>Skills</b>	<b>Programming Languages:</b> Fluent in Java, Python, C / Familiar with R, SQL <b>Natural Languages:</b> Native in Korean / Fluent in English, Mandarin Chinese	
<b>Relevant Coursework</b>	<b>Computer Science</b> (graduate courses in <b>bold</b> , courses for next semester in <i>italics</i> ) <ul style="list-style-type: none"> <li><b>Mathematical Understanding of Deep Learning, Understanding Large Language Models, Advanced Algorithm Design, <i>Optimization for Machine Learning</i></b>, Introduction to Machine Learning, Natural Language Processing, <i>Neural Networks: Theory and Applications</i></li> </ul> <b>Mathematics</b> <ul style="list-style-type: none"> <li>Real/Complex Analysis, Algebra, Probability, Statistics, Stochastic Systems, Theory of Computation, Game Theory, <i>Analysis of Big Data</i></li> </ul>	
<b>Extracurricular Activities</b>	<b>Korean Augmentation to the US Army</b> <span style="float: right;"><i>Nov 2019 - Jun 2021</i></span> Translated for high-ranking officers <b>Korean Students Association at Princeton</b> <span style="float: right;"><i>Feb 2019 - May 2019</i></span> Events Director <b>Harvard-MIT Math Tournament</b> <span style="float: right;"><i>Feb 2019</i></span> Grader <b>Princeton University Math Competition</b> <span style="float: right;"><i>Nov 2018</i></span> Tech Team, Problem Reviewer	