

Seonho Park

Center for Applied Optimization – 401 Weil Hall
University of Florida, Gainesville, FL

☎ 3522138561 • ✉ seonhopark@ufl.edu • 🌐 seonho-park.github.io
📄 Seonho Park • 🌐 seonho-park • in seanseonhopark

Updated date: April 8, 2021

Research Interests

- Uncertainty Quantification, Stochastic Optimization, Bayesian Deep Learning

Education

University of Florida

Ph.D. Industrial and Systems Engineering,

Advisor: Dr. Panos M. Pardalos

Supervisory Committee Members: Dr. José C. Príncipe, Dr. Hongcheng Liu, Dr. Mostafa Reisi-Gahrooei

Dissertation proposal title: Uncertainty-aware neural networks and applications

Gainesville, FL.

Aug. 2017-2021 (expected)

University of Florida

M.S. Industrial and Systems Engineering, GPA: 3.93/4.0

Gainesville, FL.

Dec. 2020

Hanyang University

M.S. Mechanical Engineering, GPA: 3.88/4.0

Thesis: Sequential Approximate Optimization using Dual Subproblems based on Diagonal Quadratic Approximation

Advisor: Dr. Dong-Hoon Choi

Seoul, South Korea

Feb. 2012

Hanyang University

B.S. Mechanical Engineering, GPA: 3.81/4.0, summa cum laude

Seoul, South Korea

Feb. 2010

Work Experiences

ERShares

Senior AI Researcher

Boston, MA. (work remotely, part-time)

Dec. 2020 - May 2021

- Apply mathematical and statistical techniques on data to generate investment insights
- Develop tools to optimize the firm's trading strategies and trading signals

Siemens Healthineers

Medical Imaging Deep Learning Research Intern

Princeton, NJ.

May. 2019 - Aug. 2019

- Research on active learning to quantify classification uncertainty to select Chest XRay images to be annotated
- Develop and deploy 3D ResNet architecture to classify rotator-cuff tears
- Mentors: Florin C. Ghesu, Sasa Grbic

Research Experiences

Center for Applied Optimization, University of Florida

Research Assistant

Gainesville FL.

Aug. 2017 - Present

- Uncertainty-aware neural networks and applications (Current work for dissertation)
 - Research on measuring uncertainty inherent in both model and data that can be efficiently and effectively equipped with deep neural networks
 - Research on anomaly detection based on rate-distortion theory in information theory and variational autoencoder (VAE) and using encoder-only architecture for estimating the data distribution
 - Estimating the data density using the Donsker-Varadhan variational bound on KL-divergence
- Stochastic optimization for training deep neural networks (Done by Aug. 2019)
 - Research on combining negative curvature with the adaptive cubic regularized Newton method for solving nonconvex finite-sum functions that typically arise in machine learning problems
 - The associated paper has been published in the journal, Journal of optimization theory and applications

Airforce Research Laboratory

Research Assistant, Contract Number: FA8651-08-D-0108

Aug. 2019 - Present

- o Research on using deep neural network based image matching and retrieval technique for positioning of unmanned aerial systems in GPS-denied environments
- o The paper has been submitted to the journal, Inverse Problems & Imaging
- o Now further working on fully utilizing the deep neural networks for whole procedure of positioning including reranking the retrieved SAR images and estimating homography between the query and retrieved SAR images
- o Principal investigator: Maciej Rysz, Kaitlin L. Fair

Awards and Honors

- | | |
|--|-------------|
| QSR Data Challenge Competition Finalist , <i>Quality, Statistics and Reliability (QSR) Section of INFORMS</i> | 2020 |
| <i>COVID19 CT Scan images classification competition, top 4 among 50 participants</i> | |
| KSEA-GFC Scholarship , <i>Korean-American Scientists and Engineers Association</i> | 2020 |
| <i>Awarded in recognition of outstanding research in STEM area and/or dedicated service for KSEA-GFC</i> | |
| Korean Scholastic Excellence Award , <i>Herbert Wertheim College of Engineering, University of Florida</i> | 2019 |
| <i>Awarded in recognition of scholastic excellence in graduate studies</i> | |

Publications

1. **Seonho Park**, Maciej Rysz, Kaytlin L. Fair, Panos M. Pardalos, *SAR Image-based Positioning in GPS-denied Environments using Deep Cosine Similarity Neural Networks [paper]*, Inverse Problems & Imaging, 2020
2. **Seonho Park**, George Adosoglou, Panos M. Pardalos, *Interpreting Rate-Distortion of Variational Autoencoder and Using Model Uncertainty for Anomaly Detection [paper] [code]*, Annals of Mathematics and Artificial Intelligence, 1-18, 2020
3. **Seonho Park**, Seung Hyun Jeong, Panos M. Pardalos, *Combining Stochastic Adaptive Cubic Regularization with Negative Curvature for Nonconvex Optimization [paper] [code]*, Journal of optimization theory and applications, 184, pp. 953–971, 2020
4. **Seonho Park**, Seung Hyun Jeong, Gil Ho Yoon, Albert A. Groenwold, Dong-Hoon Choi, *A globally convergent sequential convex programming using an enhanced two-point diagonal quadratic approximation for structural optimization*, Structural and Multidisciplinary Optimization 50 (5), pp.739-753, 2014
5. Seung Hyun Jeong, **Seonho Park**, Dong-Hoon Choi, Gil Ho Yoon, *Toward a stress-based topology optimization procedure with indirect calculation of internal finite element information*, Computers & Mathematics with Applications 66 (6), pp.1065-1081, 2013
6. Seung Hyun Jeong, **Seonho Park**, Dong-Hoon Choi, Gil Ho Yoon, *Topology optimization considering static failure theories for ductile and brittle materials*, Computers & Structures, 110, pp.116-132, 2012

Current works

- o Deep Data Density Estimation through Donsker-Varadhan Representation
- o Contrastive learning for SAR image searching based positioning (Sponsored by AFRL)

Presentations

1. *Uncertainty-aware Neural Networks For Medical Image Analysis*, INFORMS annual meeting, Seattle, Washington, 20-23 Oct. 2019
2. *Stochastic Adaptive Cubic Regularization with Negative Curvature for Nonconvex Optimization*, INFORMS annual meeting, Seattle, Washington, 20-23 Oct. 2019
3. *Diagnosis of Alzheimer's disease with deep learning*, Hanyang University, 4 Jul. 2016
4. *A filtered Sequential Approximate Optimization Algorithm based on Dual Subproblems using an Enhanced Two-point Diagonal Quadratic Approximation for Structural Optimization*, 12th AIAA Aviation Technology, Integration, and

Operations (ATIO) Conference and 14th AIAA/ISSMO Multidisciplinary Analysis and Optimization Conference, Indianapolis, Indiana, 17-19 Sep. 2012

5. *Development of External Module for Stress-based Topology Optimization using Commercial CAE Software Package*, The 7th China-Japan-Korea Joint Symposium on Optimization of Structural and Mechanical Systems, Huangshan, China, 18-21 Jun. 2012
6. *A New Convex Separable Approximation based on Two-point Diagonal Quadratic Approximation for Large-scale Structural Design Optimization*, 9th World Congress on Structural and Multidisciplinary Optimization, Shizuoka, Japan, 13-17 Jun. 2011
7. *Dual Optimization Approach based on Two-point Diagonal Quadratic Approximation*, The Korean Society of Mechanical Engineer 2010 Fall Conference Korean, Jeju, South Korea, 03-05 Nov. 2010
8. *Optimization for Optical Performances of LCD/BLU Using Pseudo Sensitivity*, The Korean Society of Mechanical Engineer 2009 Fall Conference Korean, Pyeongchang, South Korea, 04-06 Nov. 2009

Teaching Experiences

- o Teaching Assistant, ESI6346 Decision making under uncertainty, Spring, 2019
- o Teaching Assistant, ESI6552 Systems architecture, Spring, 2019

Professional Activities

Reviewer.....

- o Annals of Mathematics and Artificial Intelligence
- o International Journal of Bioinformatics Research and Applications
- o SN Operations Research Forum
- o Journal of Global Optimization
- o Journal of Optimization Theory and Applications

Professional Development Activities.....

- o Participant, *INFORMS Doctorate Student Colloquium*, Phoenix, Arizona, November 2-3, 2018

Services.....

- o Student Council Member, *Korean-American Scientists and Engineers Association Gainesville Florida Chapter*, 2018-present

Courses Taken

- | | |
|---|---|
| o Applied Probability Methods in Engineering, ESI6325 | o Fundamentals of Mathematical Programming, ESI6420 |
| o Linear Programming & Network Optimization, ESI6417 | o Global Optimization, ESI6492 |
| o Stochastic Modelling and Analysis, ESI6546 | o Numerical Linear Algebra, MAD6406 |
| o Machine Learning for Time Series, EEE6504 | o Fundamentals of Machine Learning, EEL5840 |
| o Introduction to Data Analytics, EIN6905 | o Statistical Methods in Research I, STA6166 |

Computer Skills

- o Programming Languages: C/C++(Professional), Python(Professional), MATLAB(Experienced), Java(Experienced), R(Experienced), FORTRAN(Experienced)
- o Others: Tensorflow, Pytorch, Theano, Scikit-learn, SQL, Gams, git, Gurobi, L^AT_EX

References

Panos M. Pardalos

Distinguished Professor, Industrial and systems engineering, University of Florida

pardalos@ise.ufl.edu

Maciej Rysz

Assistant Professor, Information Systems & Analytics, Farmer school of business, Miami University

ryszmw@miamioh.edu