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# Duygu Sap

## Education

2011–2017 **Ph.D. and M.Sc. in Mathematics**, *University of Pittsburgh, PA, USA*.
Specialized in Numerical Analysis & Scientific Computing

2008–2011 **M.Sc. in Electronics and Communication Engineering**, *Istanbul Technical University, Turkey*.
Specialized in Electromagnetism

2006–2007 **B.Sc. (Education Abroad) in Mathematical Sciences**, *Durham University, UK*.

2004–2008 **B.Sc. in Mathematical Engineering (with a minor in Engineering Physics)**, *Istanbul Technical University, Turkey*.

## Working Experience

2020-present **Information Technology Business Analyst (Part-time)**, *Nisan Design Group, LLC*, San Francisco, CA, USA.

2017-2020 **Postdoctoral Researcher**, *International Computer Science Institute*, Berkeley, CA, USA.
- Constructed a theoretical framework for the interoperability of distinct CAD systems using tools from algebraic topology and analysis, and built an automated system that tests for the interoperability of Rhinoceros and OpenCASCADE (Funded by DARPA). Papers on this work are listed in the publications section.
- Reviewed the geometry validation practices carried out by CAx Implementor forum, and devised and recommended improvements on test classifications and threshold definitions to NIST.
- Reviewed the 3D model validation tests provided in the military standards 31000A. A technical report on this work is listed in the publications section.

2011–2017 **Graduate Teaching Fellow**, *University of Pittsburgh*, PA, USA.
- Led recitations for or taught the following courses: *Analytic Geometry and Calculus (I,II,III)*, *Business Calculus*, *Introduction to Analysis*

2009–2011 **Research and Teaching Assistant**, *Istanbul Technical University*, Turkey.
- Constructed MRI-based breast models for use in the breast cancer research carried out at microwave frequencies by utilizing several image processing tools such as smoothing and edge detection filters, and Gaussian mixture models
- Modeled the dielectric value distribution via piecewise-linear and cubic-spline interpolation techniques to investigate the electrical property variations in breast tissues.
- Led recitations for the following courses: *Introduction to Electromagnetic Fields*, *Microwave Engineering*, *Linear Algebra and Applications*, *Probability and Statistics*.

2007 **Automation Software Engineer (Summer Intern)**, EST Enerji, Istanbul, Turkey.
- Constructed SCADA (Supervisory Control And Data Acquisition) system windows.
- Learned how to use the InTouch HMI Software.
- Acquired an online certificate of Siemens on PLCs.

2006 **Research Scientist (Summer Intern)**, *Istanbul Technical University*, Turkey.
- Constructed mathematical models based on regression and FFT in Matlab predicting the period of the sunspot cycle.
- Presented the results of the research under the name "Time series analysis applied to Ionospheric data" at the 12th Conference on Computer Aided Engineering and System Modeling in Turkey.

## Awards & Fellowships

2011-2017 GSR Summer & Tuition Scholarships by the University of Pittsburgh, PA, USA.

2006-2007 Erasmus Scholarship by ITU, Turkey, and Durham University, UK.

2004-2008 High Honors or Honors in Mathematical Engineering, ITU, Turkey.

## Publications

2019 A review of military standards - 31000A, ICSI Technical Report, Berkeley, CA, USA.

2019 An automated approach for the discovery of interoperability w. D. P. Szabo, preprint, arXiv:2001.10585.

2019 On verification of interoperability of CAD systems with a focus on invariant properties w. V. Shapiro, Computer-Aided Design, 115:256-266.

2018 Macro Stokes elements on quadrilaterals w. M. Neilan, International Journal of Numerical Analysis and Modeling, 15(4-5):729-745.

2016 Stokes elements on cubic meshes yielding divergence-free approximations w. M. Neilan, Calcolo, 53(3):263-283.

2011 The derivation of breast cancer models from MRI images for breast cancer detection, Master's thesis, Institute of Natural & Applied Sciences, ITU, Istanbul, Turkey.

2008 Genetic algorithms applied to floor-plan area optimization problem, B.Sc. Thesis, Faculty of Science & Letters, ITU, Istanbul,Turkey.

2006 Time series analysis applied to Ionospheric data, Technical Report, Faculty of Sciences & Letters, ITU, Istanbul, Turkey.

## Computer skills with applied areas

C, Python, Matlab, Rhinoceros, Rhino.Python *Research*

Freefem++, Fenics, C++, Java,TensorFlow, Pytorch, Scipy, Numpy *Coursework*

## Certificates

- Fundamentals of Reinforcement Learning, *Online course offered by the University of Alberta*
- Scalable Machine Learning on Big Data using Apache Spark, *Online course offered by IBM*
- Building Deep Learning Models with TensorFlow, *Online course offered by IBM*
- Introduction to Deep Learning & Neural Networks with Keras, *Online course offered by IBM*
- Machine Learning with Python, *Online course offered by IBM*
- Python for Data Science and AI, *Online course offered by IBM*
- Smart Contracts, *Online Course offered by the University of Buffalo*
- Blockchain: Foundations and Use Cases, *Online Course offered by ConsenSys Academy*
- Introduction to Blockchain Technologies, *Online Course offered by INSEAD through Coursera*
- Neural Networks and Deep Learning, Online course offered by *deeplearning.ai*
- Fundamentals of Quantitative Modeling, *Online Course authorized by the University of Pennsylvania*
- Introduction to Spreadsheets & Models, *Online Course authorized by the University of Pennsylvania*
- Modeling Risk & Realities, *Online Course authorized by the University of Pennsylvania*

## Independent Research Projects

- Language processing using LSTM on Penn Treebank dataset. Model constructed in TensorFlow.
- MNIST digit recognition with AutoEncoders. Model constructed in TensorFlow.
- Collaborative filtering using RBM on a MovieLens dataset. Model constructed in Python using scikit-learn.
- Loan application classification using KNN, DT, SVM and Logistic Regression in Python using scikit-learn.

## Workshops & Conferences

- Workshop on Lattices: Geometry, Algorithms and Hardness, Simons Institute for the Theory of Computing, Berkeley, CA, USA, 2020.
- International Geometry Summit, Vancouver, Canada, 2019.
- Deep Learning Boot Camp, Simons Institute for the Theory of Computing, Berkeley, CA, USA, 2019.
- Symposium on Solid and Physical Modeling, and DARPA Transformative Design (TRADES) Meeting, Bilbao, Spain, 2018.
- TRX+Design for Additive Manufacturing, America Makes & Autodesk, San Francisco, CA, USA, 2017.
- SIAM Annual Meeting, David Lawrence Convention Center, Pittsburgh, PA. USA, 2017.
- Finite Element Rodeo, University of Houston, Houston, TX, USA, 2017.
- Finite Element Circus, Worcester Polytechnic University, Worcester, MA, USA, 2016.
- Finite Element Rodeo, Texas A&M University, College Station, TX, USA, 2016.
- Geometric PDEs and their Approximations, Winter School, Texas A&M University, College Station, TX, USA, 2016.
- Finite Element Circus, University of Massachusetts, Dartmouth, MA, USA, 2015.
- International Symposium on Microwave and Optical Technology, Prague, Czech Republic, 2011.
- The 12th Conference for CAE and System Modeling, Antalya, Turkey, 2006.

## Languages

(Native) Turkish

(Fluent) English

(Elementary) French, German