

# Üstün Yıldırım

University of Rochester  
Department of Mathematics  
500 Joseph C. Wilson Blvd.  
Rochester, NY 14627

Email: [ustun@mailbox.org](mailto:ustun@mailbox.org)  
Website: [ustunyildirim.com](http://ustunyildirim.com)  
Github: [github.com/UstunYildirim](https://github.com/UstunYildirim)  
Phone: +1 (315) 954-0240

## Education

2012-2018	<b>Michigan State University, USA</b> Ph.D., Mathematics
2007-2012	<b>Middle East Technical University, Turkey</b> B.S., Mathematics
2007-2012	B.S., Computer Engineering

## Academic Appointments

Fall 2018 - (current)	<b>University of Rochester</b> Visiting Assistant Professor
Spring 2016 - Spring 2018	<b>Michigan State University</b> Research Assistant
Fall 2012 - Spring 2018	Teaching Assistant
Fall 2014 - Fall 2016	Math Learning Center Lead TA
Fall 2015	Mentoring Leader at the Center for Instructional Mentoring

## Professional Experience

### 1. Mobilus, Turkey (Jan 2012 - May 2012) (Current name in US is Invidyo)

Invidyo develops smart video baby monitor systems. As a software developer, I worked at many different parts of the system. Some highlights:

- Developed their initial camera setup/registration process via a Java applet running on clients' web browsers including server side callbacks,
- Developed their first iOS app including the relevant back end,
- Developed a browser based viewing experience similar to the iOS app by adapting an open source media player called "Strobe Media Playback" using ActionScript 3.0,
- Occasionally helped the team with other minor tasks on the server side which is developed with Java Seam Framework.

Skills used:

- Java, Objective-C, Action Script 3.0 on the client side,
- Java Seam Framework on the server side,
- Adapting an open source media player "Strobe Media Playback" to the project.

### 2. KOVAN Research Laboratories (Summer 2010)

KOVAN Research Laboratories' work focuses on research and development of intelligent systems and robotics inspired by nature. As an intern software developer, I developed:

- visualization tools for tracking swarm bots,
- embedded software to exhibit various simple swarm bot behaviors in order to test the visualization tools.

Skills used:

- embedded software in C/C++,
- Python for processing the log files generated by the bots.

## Publications

1. Üstün Yıldırım. On the complex Cayley Grassmannian. *Journal of Algebra*, 547:519–537, 2020
2. Selman Akbulut and Ustun Yildirim. Complex  $G_2$ -manifolds and Seiberg-Witten Equations. *Journal of Gokova Geometry Topology*, 13:15–40, 2019
- Emily Windes and Ustun Yildirim. Two-Frame Fields on Simply Connected Spin 7-Manifolds. (Submitted to Proceedings of the 12th ISAAC Congress, February 2020.)

## Honors and Awards

1. *Dissertation Completion Fellowship* (Summer 2018)
2. *Excellence in Teaching Award* (Spring 2016)
3. *Herbert T. Graham Scholarship* (Fall 2014)

## Projects

### 1. **Handwritten Digit Recognition** (02/2020 - Present)

- Implemented fully connected deep neural networks using only Numpy to recognize handwritten digits from the MNIST database.
- Implemented back propagation, ADAM optimization and mini-batch gradient descent.
- Implemented k-nearest neighbor with PCA.

Source code available at <https://github.com/UstunYildirim/MNIST>

### 2. **Tweet Collector and Generator** (02/2020 - Present)

- Location based tweet collection using Tweepy.
- An LSTM based neural network training on the tweets collected and generation of new ones using Keras.

Source code available at <https://github.com/UstunYildirim/Tweet-Collector-and-Generator>

### 3. **ML-Snake** (12/2019 - Present)

- The classic snake game powered with handwritten (i.e. only Numpy is being used) Deep Reinforcement Learning algorithms

Source code available at <https://github.com/UstunYildirim/ML-Snake>

#### 4. **AI Competition Engine** (01/2012)

- Single handedly wrote an AI contest engine for METU Computer Club (CClub) AI Contest 2012.
- The engine periodically takes two AIs (submitted by the contestants), competes them against each other in a RTS game, and creates a log of the game to be visualized later.

Source code available at [https://github.com/UstunYildirim/CCLUB\\_AI\\_Challenge](https://github.com/UstunYildirim/CCLUB_AI_Challenge).

## Teaching Experience

- Calculus I-II and Multivariable Calculus
- Differential Equations
- Linear Algebra (proof based)
- Differential Geometry (proof based)

## Certificates and Skills

- Certificate<sup>1</sup> in Deep Learning Specialization from Coursera (Feb, 2020) including five courses
  - Neural Networks and Deep Learning
  - Improving Deep Neural Networks: Hyperparameter tuning, Regularization and Optimization
  - Structuring Machine Learning Projects
  - Convolutional Neural Networks
  - Sequence Models
- Professional experiences with Java, C/C++, PHP, Objective-C, ActionScript 3.0, JavaScript, MySQL, SVN
- Others: Python, Haskell, Keras, Tensorflow, Sage, Octave/MATLAB, 10+ years of Linux experience (current OS: Parabola GNU/Linux)

## Voluntary Work

- Scientific staff, workshop organizer and webmaster at [the Gokova Geometry Topology Institute \(GGTI\)](#)
- Founding board member of METU Student Chapter of SIAM, Webmaster (2011), Co-President (2012)
- Board member of METU Computer Club (2009-2012).

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<sup>1</sup>verify at <https://www.coursera.org/verify/specialization/NPY395CGPS35>