Course title and number: CSCE 689: Machine Learning Based Systems
Term (e.g., Fall 200X): Fall 2018
Meeting times and location: MW 5.45PM to 7.00PM

Course Description and Prerequisites
This is an interdisciplinary course that combines machine learning, operating system, and computer architecture. The course shows how machine learning can be used to address various system related issues. It will cover recent developments of deep learning and other machine learning models as well as system related topics such as system reliability, program synthesis, system efficiency, approximation techniques, anomaly detection etc. Finally, the course will discuss the application of various machine learning models to solve each of these system related issues.

Prerequisites: There is no prerequisite for this course. A basic understanding of machine learning, operating system, and computer architecture might be necessary for the projects.

Learning Outcomes or Course Objectives
- Students will learn current best practices in machine learning such as convolutional neural net (CNN), recurrent neural net (RNN), long short term memory (LSTM), genetic programming etc.
- Students will learn system related issues such as code generation, debugging, system reliability and efficiency etc.
- Students will learn how machine learning can be applied to those issues.
- Students will investigate frameworks for autonomous vehicles and distributed training.
- Students will learn to critically analyze state-of-the art research papers in systems and machine learning areas.

Instructor Information
Name: Abdullah Muzahid
Website: http://people.tamu.edu/~abdullah.muzahid/index.html
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Office hours: Mondays and Wednesdays, 3.00PM – 4.30PM
Office location: 324 HRBB

Textbook and/or Resource Material
There is no textbook for this course. Research papers will be provided throughout the course.
Grading Policies

**Presentations (30%)** - Students will present some research papers and lead thought provoking discussion in the class.

**Attendance & Participation (10%)** - Students need to attend the lectures and actively participate in discussion.

**Homework (10%)** - There will 3-4 homeworks throughout the course. The homeworks will provide opportunity for thinking out-of-the-box.

**Project (50%)** - There will be one big project at the end. It will be either a single person project or a group projects based on the scope of the work. The project will require finding a new idea, implement the idea, collect experimental data, and finally present the results in the form of a presentation and report.

Grading Scale

A = 90-100  
B = 80-89  
C = 70-79  
D = 60-69  
F = <60

Course Topics, Calendar of Activities, Major Assignment Dates

<table>
<thead>
<tr>
<th>Week</th>
<th>Topic</th>
<th>Assignments</th>
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</thead>
<tbody>
<tr>
<td>1-2</td>
<td>Deep learning models (Neural net, CNN, RNN, LSTM etc.)</td>
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<tr>
<td>3-6</td>
<td>Learning based program analysis</td>
<td>Homework 1 out</td>
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<tr>
<td>7-10</td>
<td>Learning based program synthesis</td>
<td>Homework 2 out, homework 1 due, project proposal due</td>
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<tr>
<td>11-12</td>
<td>Branch prediction, prefetching, approximate computing</td>
<td>Homework 3 out, homework 2 due</td>
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<tr>
<td>13</td>
<td>Performance analysis and machine learning</td>
<td>Homework 3 due</td>
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<tr>
<td>14</td>
<td>Project presentation</td>
<td>Report due</td>
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Paper lists for each topic will be announced in the first class of the course.
Americans with Disabilities Act (ADA)

The Americans with Disabilities Act (ADA) is a federal anti-discrimination statute that provides comprehensive civil rights protection for persons with disabilities. Among other things, this legislation requires that all students with disabilities be guaranteed a learning environment that provides for reasonable accommodation of their disabilities. If you believe you have a disability requiring an accommodation, please contact Disability Services, currently located in the Disability Services building at the Student Services at White Creek complex on west campus or call 979-845-1637. For additional information, visit http://disability.tamu.edu.

Academic Integrity

This course is interactive and collaborative by design. Students are encouraged to collaborate, share ideas, and use external resources when available. Credit MUST be given for external resources and help from others. Sharing or adopting the work of others (including, but not limited to, presentation slides, code, written reports, and ideas) without proper citation and credit can be interpreted as plagiarism or cheating. Students will be responsible for their own code and write up for assignments and projects, as well as slides for presentation. Use your best judgment in using outside resources and be mindful of the university integrity policies.

“An Aggie does not lie, cheat, or steal, or tolerate those who do.”