

# IST 402.2 EMERGING TRENDS IN MACHINE LEARNING

Amulya Yadav

Fall 2019

<https://amulyayadav.github.io/EmergingTrendsML/>

# OVERVIEW

- Course Mechanics
  - Personnel
  - Schedule
  - Course Content
  - Evaluation
  - Policies
  - Misc.
- What do you want to learn?
- A Brief History of AI/ML

# INSTRUCTOR

- Amulya Yadav
  - PhD 2018 → University of Southern California (USC)
  - Personal Research
    - Artificial Intelligence and Machine Learning for Social Good
    - Raising Awareness about HIV among Homeless Youth using AI Techniques
      - Video - <https://www.youtube.com/watch?v=eWvE7Gvsr9c>
    - ML to Promote Farmer Incomes, Deep Learning to Teach Autistic Kids
    - Preventing Poachers using AI/ML based Randomized Patrol Patterns



# CONTACT ME

- Most Preferred Method (for questions/doubts/discussion on course content):
  - Piazza: [piazza.com/psu/fall2019/ist40204](https://piazza.com/psu/fall2019/ist40204) (Access Code: 402.4)
- For any other question:
  - Email: [amulya@psu.edu](mailto:amulya@psu.edu)
    - Send a reminder email if I don't respond within 24 hours
  - My Office Hours (if you want to meet in person)
    - By appointment – please send me an email to schedule an appointment

# TEACHING ASSISTANT



KAIXUAN ZHANG  
Ph.D. Student at IST

# TEACHING ASSISTANT

- Kaixuan Zhang (Email: [kuz22@psu.edu](mailto:kuz22@psu.edu))
- TA Weekly Office Hours
  - 2:30 PM to 4 PM, Monday and Wednesday
  - Location: E301 Westgate
  - Starting next week when Kaixuan returns!
- One stop person to answer all your questions about this course!
  - He will be there on Piazza to answer any questions that you might have

# CLASS SCHEDULE

- Tuesdays and Thursdays
- Time: 4:35 PM to 5:50 PM
- Location: Earth and Engineering Sciences 121

# COURSE CONTENT

- What is this course about?
  - Machine Learning has impacted our society in a profound way
  - Almost every device/computer/mobile application that you can envision uses ML in some or the other way
  - Recent Trend: The Rise of Deep Learning
    - Often called a panacea for all problems affecting society?

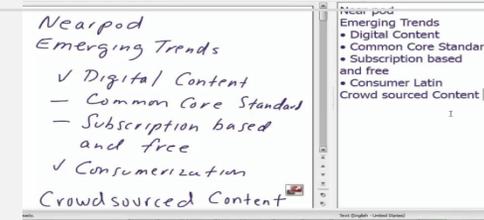
# THE RISE OF DEEP LEARNING



Personal Assistants



Recommendation Systems



Text Scanning



Advertising



Face Recognition



Anomaly Detection

# THE RISE OF DEEP LEARNING



Language Translation



Music Search



3D Modeling



Image Detection  
and Manipulation



Speech to Text



Route Planning

# COURSE CONTENT

- You must know about ML as an IST graduate
  - Quickly becoming indispensable!
- Lots of money is being spent around the world to do ML research
  - State of the field of ML is dynamically evolving
  - New frontiers of research are continuously being opened
  - Information in ML books is quickly becoming obsolete
- This course introduces the most recent trends in the field of ML

# COURSE LEARNING GOALS

- Learn about new emergent trends in ML research
  - Deep Learning
  - Fairness in Machine Learning
  - Transparency in Machine Learning
  - Adversarial Machine Learning
  - Deep Fakes
  - Ethics in Machine Learning
- Goal: At the end of the course, you should be capable of holding an intelligent “**meta-level**” conversation about any of these topics with any person (including AI experts)

# COURSE LEARNING GOALS

- Learn about new topics:
  - Deep Learning
  - Fairness in ML
  - Transparency
  - Adversarial ML
  - Deep Fakes
  - Ethics in ML

VERY LITTLE TECHNICAL CONTENT,  
MATH, ETC.

- Goal: At the end of the course, you should be capable of holding an intelligent “**meta-level**” conversation about any of these topics with any person (including AI experts)

# COURSE SYLLABUS

- General outline of syllabus is available at course website:
  - <https://amulyayadav.github.io/EmergingTrendsML/>
- But that is subject to change. Why?
  - ML Research evolves every day. To account for this dynamic nature, we will adaptively incorporate/remove articles from our syllabus to reflect cutting-edge developments around the world
  - Want to find out more about you! What do you want from this course?
    - Poll at <https://www.surveymonkey.com/r/H282W8X>

# COURSE EVALUATION

- No exams, no assignments!!! 😊
- Reflective Statements on Articles/Papers – 30%
- Class Participation – 10%
- Class Note and Class Presentation Scribing – 10%
- Final Project – 50%

## REFLECTIVE STATEMENTS ON ARTICLES/PAPERS – 30%

- There is a paper/reading list for each class.
- Students are expected to finish the class readings before class
- Critical reflection statements on class readings due 24 hours before each class
- Critical Reflection Statement – 2-3 paragraphs should be sufficient, not more than that
  - Think you are reviewing a paper. The summary should similarly have three paragraphs
    - Your opinion on the paper/article
    - Any weaknesses in the claims made
    - Any ideas for Potential Extensions to the Paper/article

## CLASS PARTICIPATION – 10%

- For each class, I will compile the reflective statements that you submit into a powerpoint
  - Use that to drive discussion around the paper/article content
- Student is expected to take active part in that discussion. The instructor will encourage discussion by asking the right questions, but most of the answers are expected to be given by students.

## CLASS NOTE AND CLASS PRESENTATION SCRIBING – 10%

- Class has 45 students (I think)
- 15 weeks of classes
- Students will be divided into 15 groups of 3, one for each week
- Each student group will be responsible for preparing course notes and lecture presentations based on the discussion that we have during the week
  - Each group will only be responsible to prepare notes and slides for a single week during the class

## FINAL PROJECT – 50%

- Use the same groups of 3 (more preferable but won't enforce this)
- Groups of 3 students, project proposal due by mid semester (20% of total grade), final project project report at the end of class (30% of total grade). Instructor will provide detailed feedback on the project proposal and that should be addressed in the final project report.
- Main points of evaluation in the 30% grade will include: (i) Relevance to class topic; (ii) Illustration of use of concepts learned in class or from research papers in related areas; (iii) Survey of related research in the field to indicate awareness of this work; (iv) Novelty of ideas. There is considerable flexibility in the kind of project completed.

# GRADING POLICY

- Late Policy
  - Critical Reflection Statement:
    - No Late Days Allowed
    - 10% Penalty for that Statement Per Each Late Day
  - Note and Presentation Scribing
    - 3 Late Days Allowed
- Project Proposal and Project Report:
  - No Late Days Allowed
  - Please Contact Instructor One Week in Advance if you cannot present your allotted paper for some reason

# ACADEMIC INTEGRITY

- Your submissions should be your own work!
- Discussing papers with your peers is allowed, even encouraged!
- However, you should write your own paper summaries.
- Be careful not to plagiarize anyone else's idea in your project proposal and final project report.

# QUESTIONS?

- ACTION ITEMS
  - Give survey at <https://www.surveymonkey.com/r/H282W8X>
  - Register at Piazza: [piazza.com/psu/fall2019/ist40204](https://piazza.com/psu/fall2019/ist40204) (Access Code: 402.4)
  - Form teams of 3 for your scribing duties by end of this week (please post your groups on Piazza by Sunday)
    - Keep discussion of group formation in the “other” folder on Piazza