ECE 6545 Deep Learning for Image Analysis
Spring 2026 Course Information

Course content

- Introduction to machine learning
- Linear models and multilayer neural networks
- Error backpropagation algorithm and neural network training
- Convolution and max-pooling operations; image classification
- Training CNNs and modern architectures
- Object detection
- Upsampling and transpose convolution operations; Image segmentation
- Unsupervised learning, self-supervised learning, and contrastive learning
- Transformer models
- Generative models; VAEs, GANs, diffusion based models
- Vision Language Models

Required background

- Undergraduate level coursework in i) Linear algebra, ii) Calculus, and iii) Probability.
- Working knowledge of Python.
- We will use Numpy, Pytorch, Mayplotlib, Jupyter notebook for assignments. Previous knowledge useful but not required.

Course information:

- Lectures: TuTh 10:45-12:05 @ WEB L122
- Instructor: Tolga Tasdizen, Email: u0301982@utah.edu

Resources

- Canvas course page: We will post lecture our slides / notes, links to additional resources and important notifications. Online discussion and questions to instructor and TA. All assignments will be handled via Canvas.
- Textbook: Deep Learning by Goodfellow, Bengio and Courville, MIT Press 2016. Freely available online at https://www.deeplearningbook.org.
- Other resources: Stanford CS231N website http://cs231n.stanford.edu.
  Pytorch website: https://pytorch.org. Tutorials and documentation.

Grading

- Assignments (70 points)
  - You will be expected to implement algorithms in Python using Numpy and Pytorch, analyze your results visually and quantitatively, and produce written summary and analysis.
  - All assignments will be submitted via Canvas.

  - Late assignment policy: You have 6 days grace period in total that you can use as you need (spread them around assignments as you need). 25% of points earned will be deducted for each day after the deadline once your grace period is used. Exemptions will be made only for real emergency situations. Assignments will be due at midnight, submitting past 11:59 pm will be considered late and use a grace day if available.

- Individual Project (30 points)
  - Choose from a list of projects or come up with your own project proposal
  - Python implementation (can use Pytorch or Tensorflow)
  - Project report