# Homework & Projects

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# Homework

- Two assignments.
- One will be released this week, due on 23:59PM, March 15.
- The other will be released on Match 1, due on 23:59PM, April 12.
- Only electronic versions accepted.
- Details will be posted on Piazza.

No student may give any other student any portion of their solutions or code, through any means.

# Project Policy

- Free to work individually or as a team for the final project:
  1. ideal team size: $\leq 4$ people per team
  2. for the same quality projects, preference is given to the one with fewer people on a team

# Details

- Choose from one of the following projects, or you can chose your own project, as long as it is related to deep learning:
  - you can choose one model if a paper contains multiple models.
- Understand the chosen project, and propose a new model or an improvement for the original one.
- Implement your idea and write up the report:
  - template provided after the proposal deadline.
- Can use any language and/or deep learning framework, but Tensorflow is recommended.
- Evaluation is primarily based on the novelty of the proposed model/algorithm, and the quality of the write-up.
- You are supposed to propose a variant of the existing model/algorithm, no matter how small or how good it is.
- Submissions include proposal, code, final report.

# Projects I

1. VAE-GAN-DRAW:
   - **Description**: Three standar deep generative models for image generation: 1) variational auto-encoder (VAE); 2) adversarial neural networks (GAN); and 3) DRAW (implemented by recurrent neural networks). Please choose one of the models for your project.
   - **Github**: https://github.com/ikostrikov/TensorFlow-VAE-GAN-DRAW
   - **Papers**:
     - VAE: http://arxiv.org/pdf/1312.6114v10.pdf
     - GAN: http://arxiv.org/pdf/1511.06434.pdf
     - DRAW: http://arxiv.org/pdf/1502.04623v2.pdf
2. GoogleNet:
   - **Description**: A GoogleNet implementation for large-scale image classification on ImageNet.
     Warning: the ImageNet dataset is huge, but you can modify the code to make it applicable to other data like MNIST or CIFAR.
   - **Github**: https://github.com/tensorflow/models/tree/master/inception
   - **Paper**: http://arxiv.org/abs/1512.00567

# Projects II

3. WaveNet:
   - **Description**: A generative model with explict conditional distributions model with convolutional neural networks.
   - **Github**: https://github.com/ibab/tensorflow-wavenet
   - **Paper**: https://arxiv.org/pdf/1609.03499.pdf
4. Semantic Segmentation:
   - **Description**: Convolutional neural networks for semantic segmentation of images.
   - **Github**: https://github.com/shekkizh/FCN.tensorflow
   - **Paper**: https://arxiv.org/pdf/1605.06211v1.pdf
5. Show and Tell: A Neural Image Caption Generator:
   - **Description**: Convolutional neural networks and recurrent neural networks for image captioning.
   - **Github**: https://github.com/tensorflow/models/tree/master/im2txt
   - **Paper**: https://arxiv.org/abs/1609.06647

## Projects III

6. Language Model on One Billion Word Benchmark:
   - **Description**: Language modeling with recurrent neural networks.
   - **Github**: https://github.com/tensorflow/models/tree/master/lm_1b
   - **Paper**: https://arxiv.org/pdf/1602.02410.pdf
7. Skip-Thought Vectors:
   - **Description**: Recurrent neural networks for wording embedding.
   - **Github**: https://github.com/tensorflow/models/tree/master/skip_thoughts
   - **Paper**: https://papers.nips.cc/paper/5950-skip-thought-vectors.pdf
8. Neural style:
   - **Description**: Generating images with different styles with convolutional neural networks.
   - **Github**: https://github.com/anishathalye/neural-style
   - **Paper**: https://arxiv.org/pdf/1508.06576v2.pdf

# Projects IV

9. Neural machine translation between the writings of Shakespeare and modern English:
   - **Description**: Machine translations with sequence-to-sequence model of recurrent neural networks.
   - **Github**: https://github.com/tokestermw/tensorflow-shakespeare
   - **Paper**: http://aclweb.org/anthology/C/C12/C12-1177.pdf
10. A neural conversational model:
   - **Description**: Sequence to sequence model for ChatBot:
   - **Github**: https://github.com/Conchylicultor/DeepQA
   - **Paper**: https://arxiv.org/pdf/1506.05869.pdf
11. Neural Network to colorize grayscale images:
   - **Description**: Convolutional neural networks for colorize grayscale images.
   - **Github**: https://github.com/pavelgonchar/colornet
   - **Paper**: http://tinyclouds.org/colorize/

# Projects V

12. Convolutional Neural Networks for Sentence Classification:
    - **Description**: Convolutional Neural Networks for Sentence Classification.
    - **Github**: https://github.com/dennybritz/cnn-text-classification-tf
    - **Paper**: http://www.wildml.com/2015/12/implementing-a-cnn-for-text-classification-in-tensorflow/
13. Hierarchical Attentive Recurrent Tracking:
    - **Description**: Recurrent neural networks with attention for tracking.
    - **Github**: https://github.com/akosiorek/hart
    - **Paper**: https://arxiv.org/pdf/1706.09262.pdf

# More Projects

- For more example topics, please refer to:
  http://cs231n.stanford.edu/2017/reports.html
  http://cs229.stanford.edu/proj2018/

# What to Do Next

- Form a team if necessary.
- Choose one of the projects.
- Write a 1-2 page (single column) proposal, with content including:
  - team information.
  - the project your choose.
  - a brief review of your choose project, ideas on what you want to do with the chosen project, and the timeline.
- Template will be provided on Piazza.
- Proposal due in 4 weeks (March 8).
- Only electronic version accepted; hand-in instructions will be released on Piazza.