Robot Learning Lab Projects

Foundations of Deep Learning, Winter Term 2019/20

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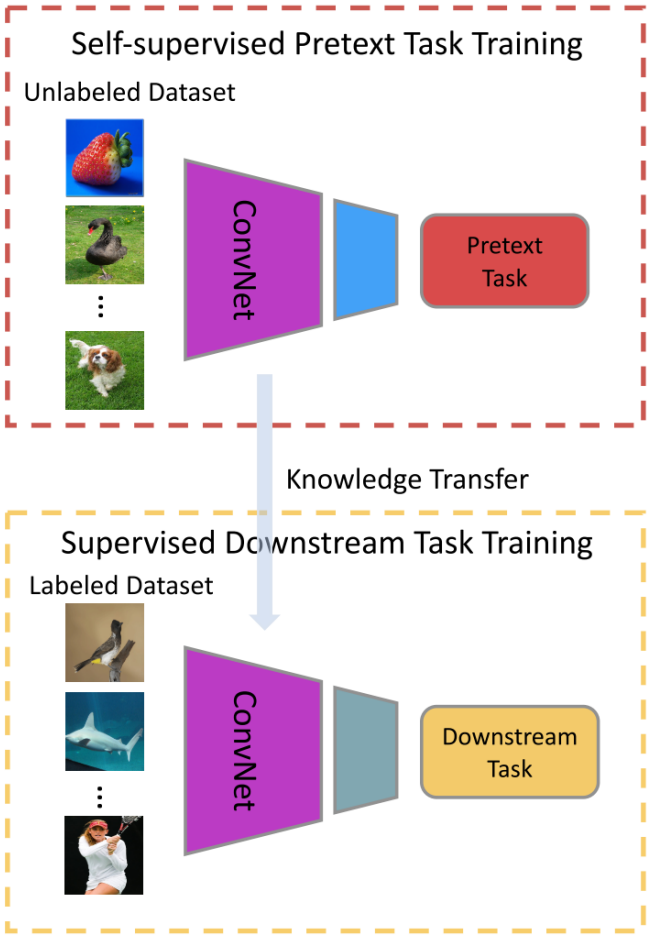
Default Project: Self-Supervised Classification

- Image clasification on the cifar-10 dataset (main task)
- Train a convolutional network to solve a pretext task (e.g. rotation, distortion, jigsaw puzzle game)
  - Create the pretext dataset and labels
- Use the learned parameters as a pre-trained model and transfer them to the convolutional network to solve an image classification task
  - Does the initialization improve classification accuracy?
- Leaderboard for this task
- If interested email Juana Valeria Hurtado: hurtadoj@cs.uni-freiburg.de



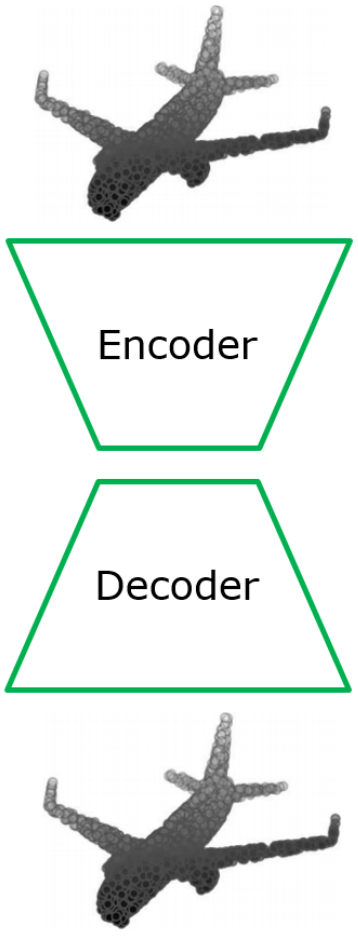
https://arxiv.org/pdf/1902.06162.pdf

Project 1: Prediction of vehicle steering angles

- Use the forward facing camera images from the vehicle and learn a model to steer
- Regression problem
- Use attention maps to visualize the steering network
  - Data collected from the car: images from 3 cameras (left, center, right) and steering angles
- If interested email Juana Valeria Hurtado: hurtadoj@cs.uni-freiburg.de

Project 2: Point Cloud Autoencoder

- Train a deep autoencoder for point clouds on the ShapeNetPart dataset using a single category (eg. car)
- Analyze the effect of the embedding size on the reconstruction error:
  - Minimum size for a decent reconstruction?
  - Does it stop improving after a certain point?
- Try different architectures for point cloud processing
- (optional) Train the autoencoder on all categories
- If interested email Daniele Cattaneo: cattaneo@cs.uni-freiburg.de



Project 3: Generative Adversarial Networks

- Train a fully-connected GAN on the MNIST dataset using low resolution images (32x32)
- Convert the FC-GAN into a DCGAN
  - Does it generate better images?
- Train the DCGAN on higher resolutions (64x64, 128x128)
- Implement some "tricks" and evaluate their effects on the generated images
- (optional) Apply what you've learned to generate the most realistic human faces.
- If interested email Daniele Cattaneo: cattaneo@cs.uni-freiburg.de