REU Update 8

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Current Work

- Trained SRResNet for 8x upscaling
- REU final paper
- Working on Super-Resolution for Classification, i.e., a method of fine-tuning the SRResNet to produce better classification results
  - Standard fine-tuning based on classification loss
  - LWF
  - Residual Loss
  - Defensive Distillation
  - Adversarial examples inspired techniques



Adversarial Examples

- Adversarial training alone could make the classifier more robust to small changes in input caused by super-resolving LR images
- Many techniques for generating perturbations could be adapted to produce perturbations that push the HR training images towards the SR images produced by SRResNet
- Example for Fast Gradient Sign method of producing adversarial examples:
  - $\eta = -\epsilon sign(\nabla_{I^{HR}} MSE(I^{HR}, I^{SR}))$

Future Plans

- Train low resolution ImageNet classifier to use as initialization for the LR classifier
- Rerun experiments for upscaling factor of 8x
- Choose methods to pursue for super-resolution for classification
  - Fine-tuning good baseline option
  - Might be able to use residual loss? Not sure if it will preserve HR classification performance currently
  - Train classifier on adversarial examples
  - Adapt adversarial examples techniques to produce super-resolution perturbations



Thank you! Questions?