Deep Learning revolutionized Computer Vision

- Initial success
- Prompted application in many domain-specific tools
- Image classification
- Generation
- Super-resolution
- Style transfer

Can we perform complex image synthesis tasks using just image classifiers?

Robustness is all you need

Goal: Develop a toolkit for image synthesis using robust classifiers

- Just gradient descent on simple loss functions
- No domain-specific priors and regularizers
- Minimal tuning
- Single classifier for all tasks

Image generation

Class maximization starting from random noise
(sample seed from multivariate Gaussian to ensure diversity)

Image-to-image translation

Train a (robust) classifier to distinguish between domains

- horse → zebra
- apple → orange

Super-resolution

Maximize underlying class to enhance input features

In-painting

Maximize underlying class while matching uncorrupted image

Interactive image manipulation

Sketch-to-image: Turn crude sketches into “art”

Feature painting: Add features to specific parts of the image

Takeaways

- Robustness is be important beyond security
- Robust classifiers can be powerful primitives

Full paper, blog post, robustness library: