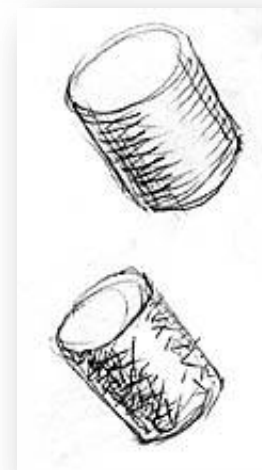
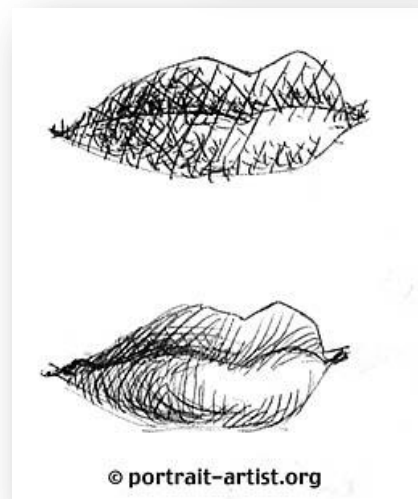
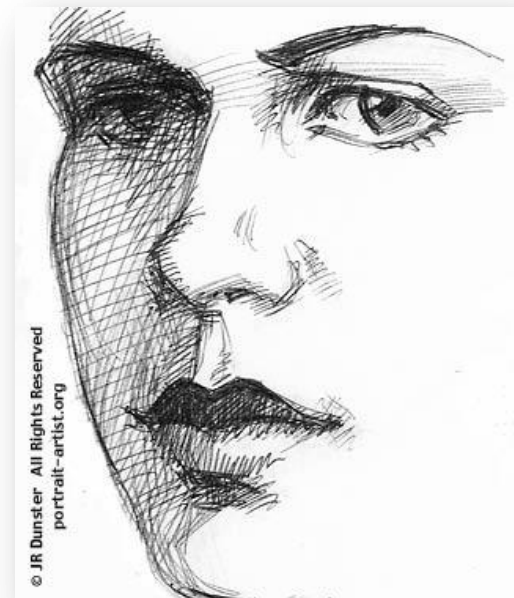


# Learning and Producing 2D Artistic Shadings of 3D Models

Sehoon Ha  
John Turgeson  
Karthik Raveendran

# Motivation



# Application: In-betweening

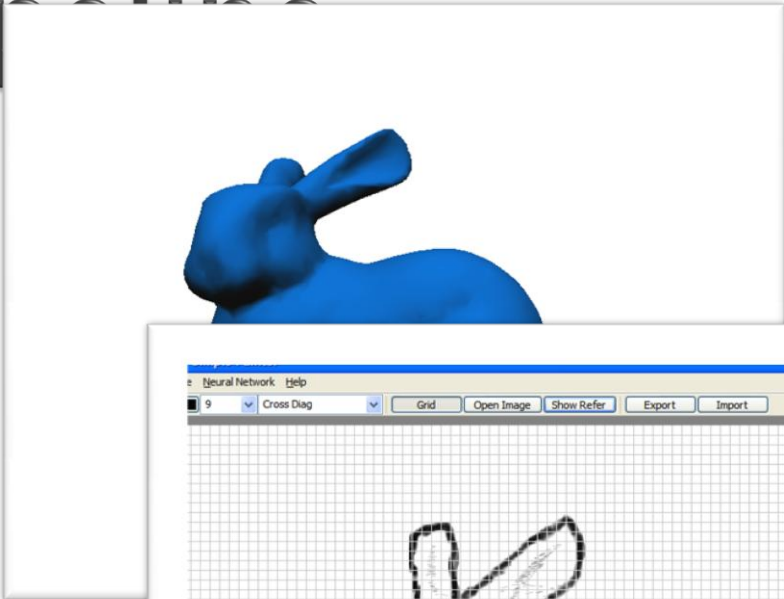


Running - Rich Diesslin © 1984,2003  
Drawing for Animation

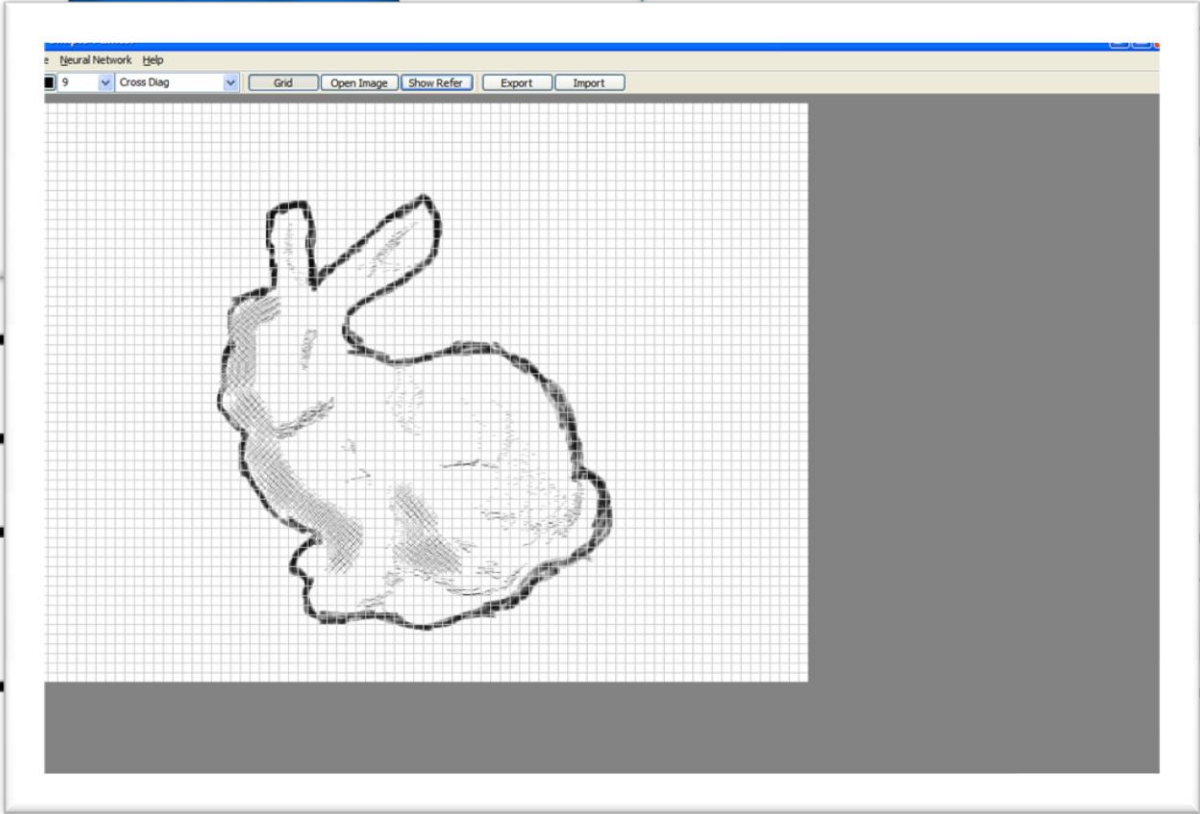


In-betweening - Rich Diesslin © 1984,2003  
Drawing for Animation

# Pipeline



points of interest from 2D

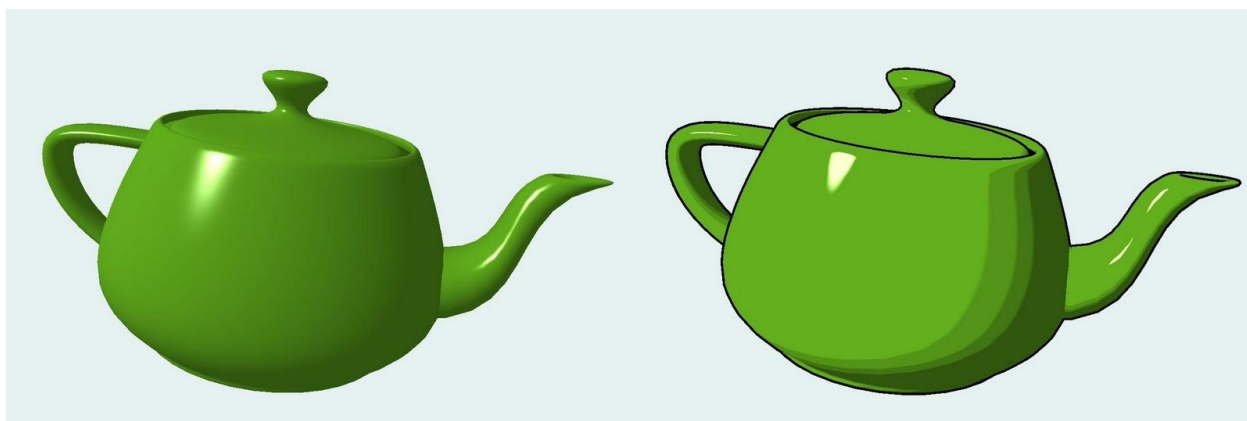
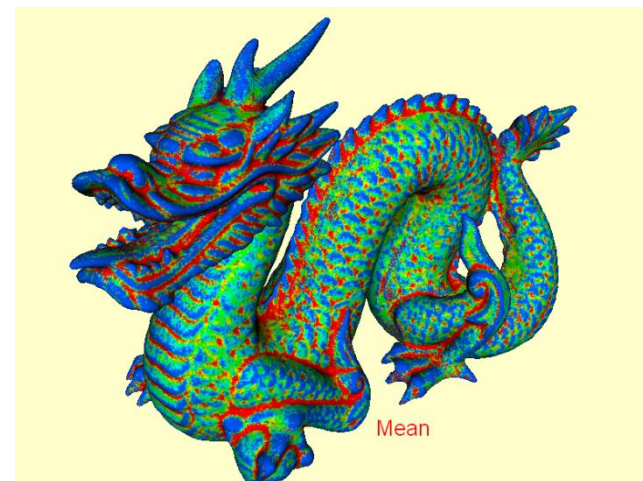


the  
algorithm



# Feature Vector

- Diffuse component
- Distance from camera
- Mean curvature
- Distance to closest edge
- Is the closest edge a silhouette edge?



# Classification Vector

- Intensity
- Brush Size
- Brush direction
- Brush Type

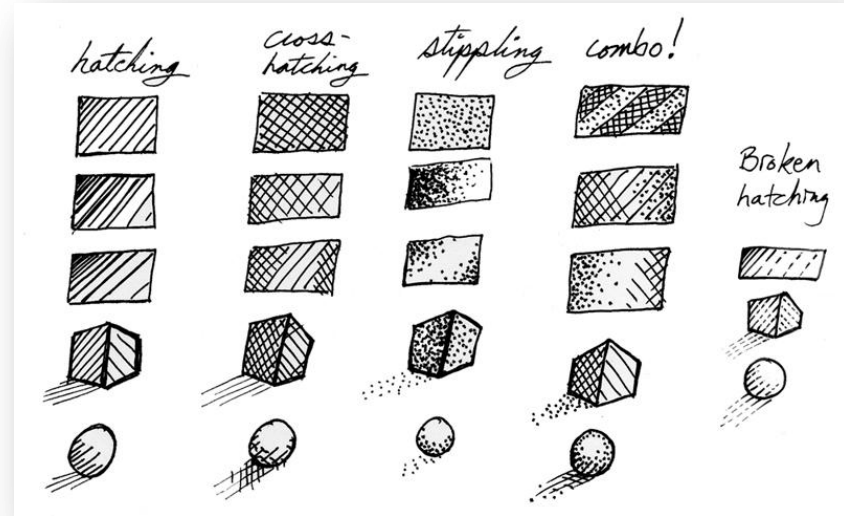
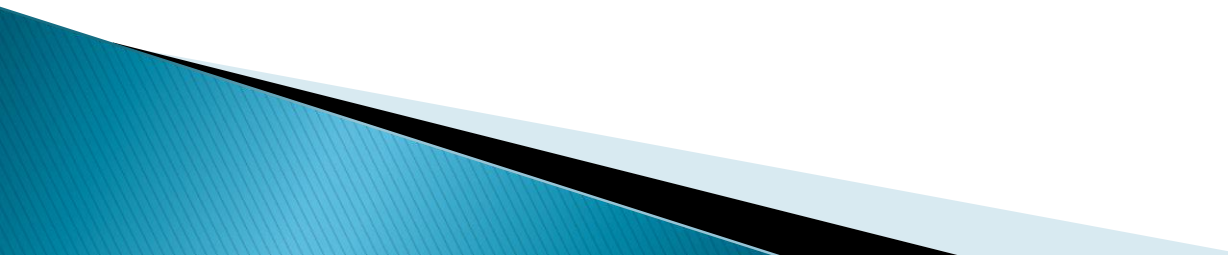


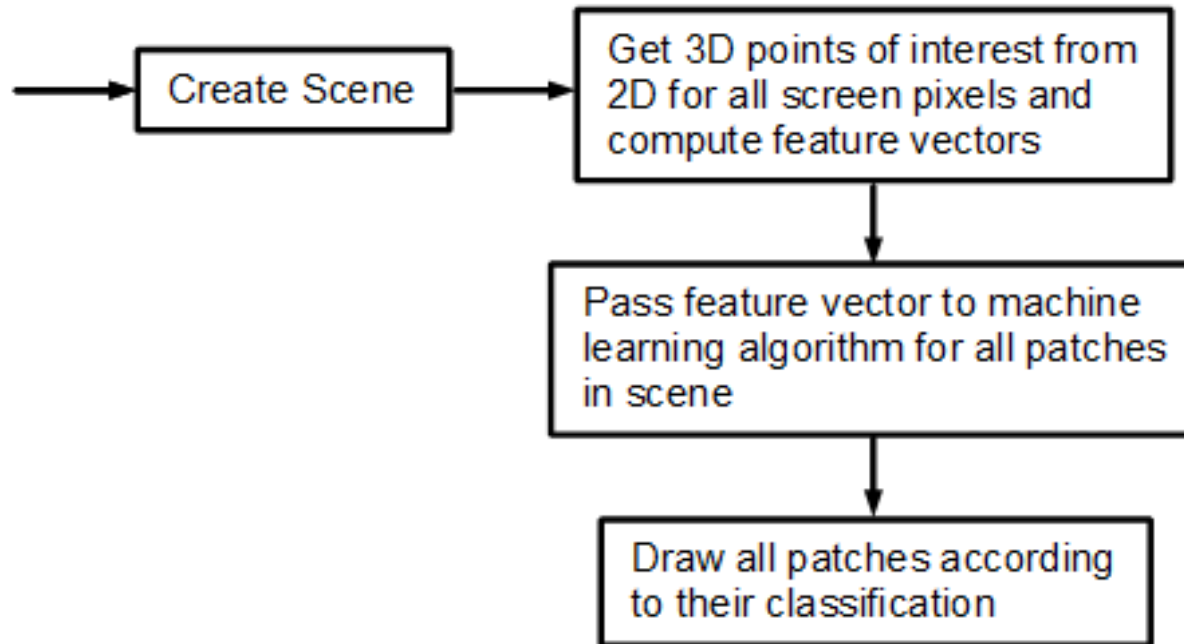
Image from: <http://bradalbright.blogspot.com/>

- Solid
- Line – uses mouse velocity to determine hatching
  - Diagonals (forward, backward, cross)
  - Stripes (horizontal, vertical)
  - Cross

# Learning Algorithms

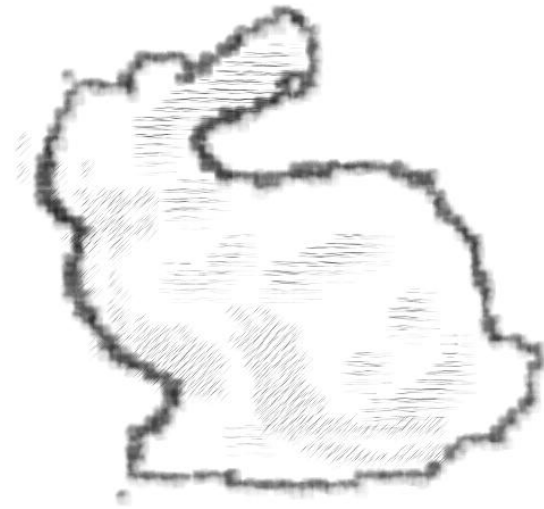
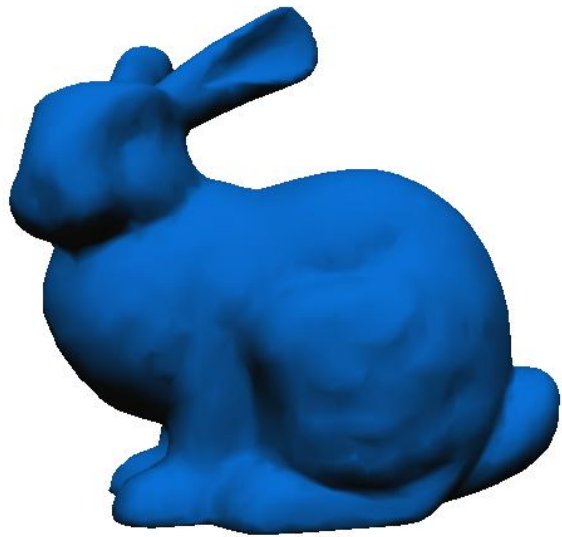
- Neural Network (3 layers, 13–15 hidden neurons)
  - kNN (5 neighbors)
- 

# Synthesizing New Images

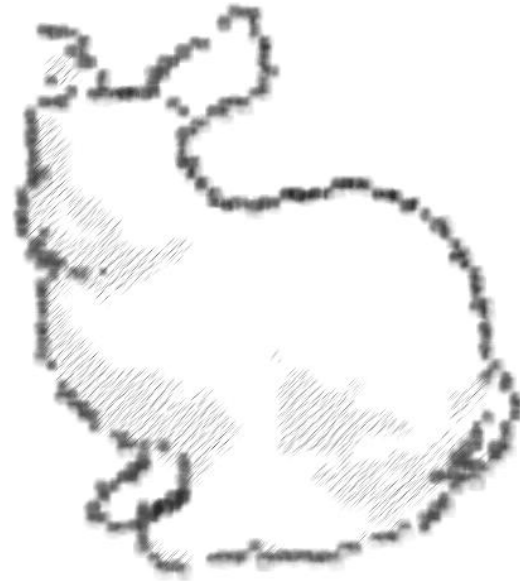
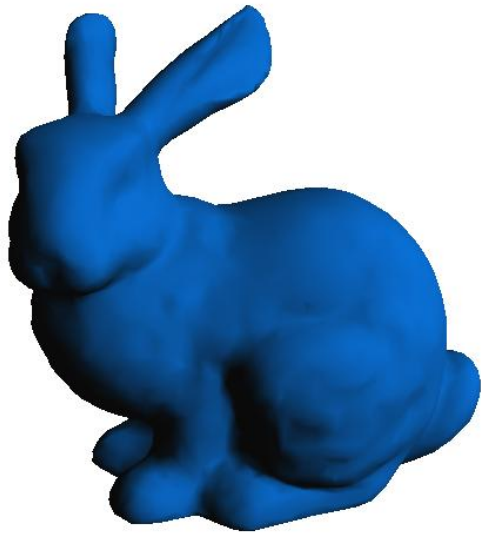




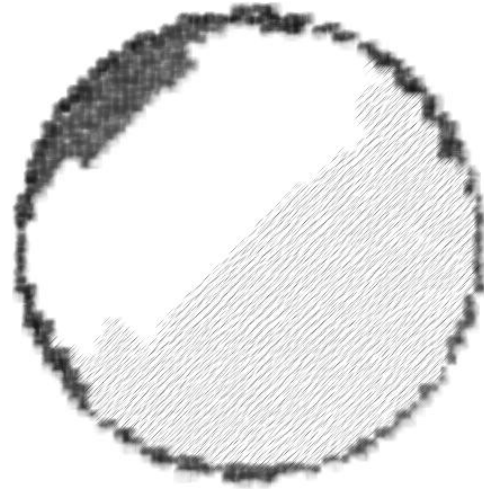
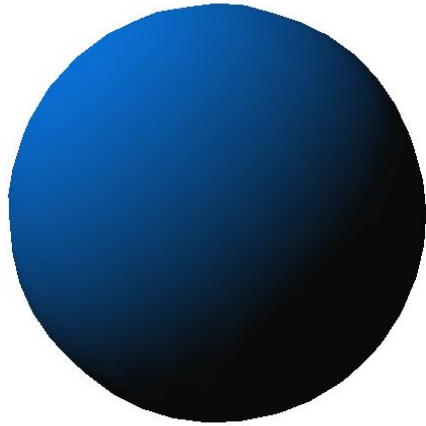
# Results: Bunny Reference



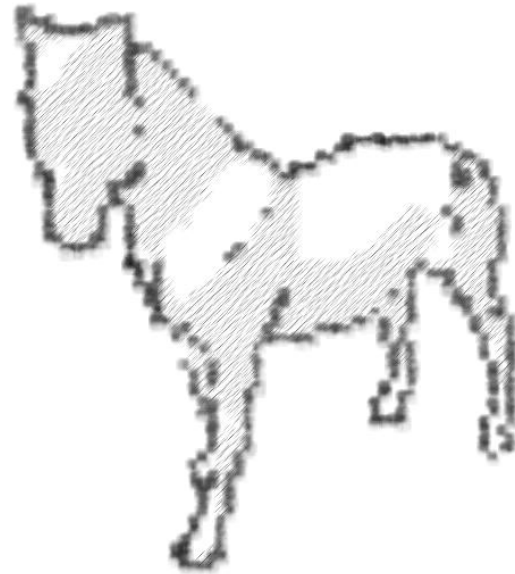
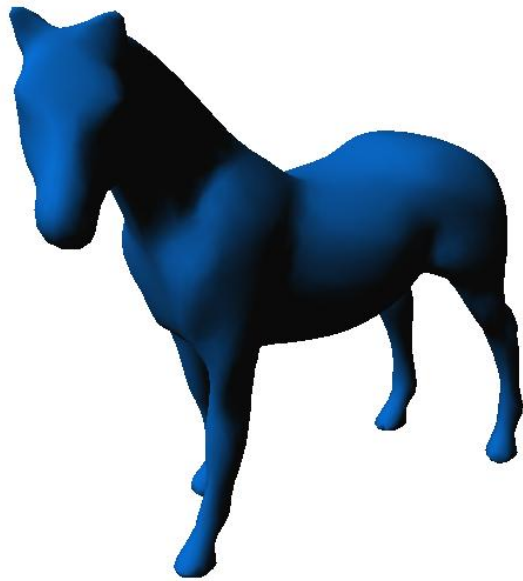
# Bunny Synthesized



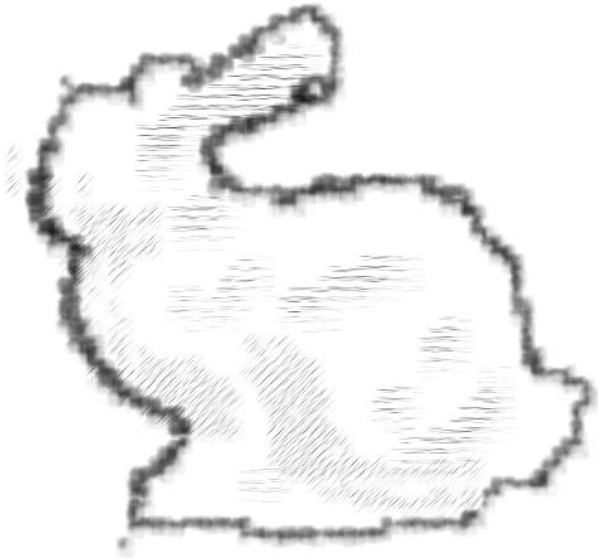
# Applied to other shapes



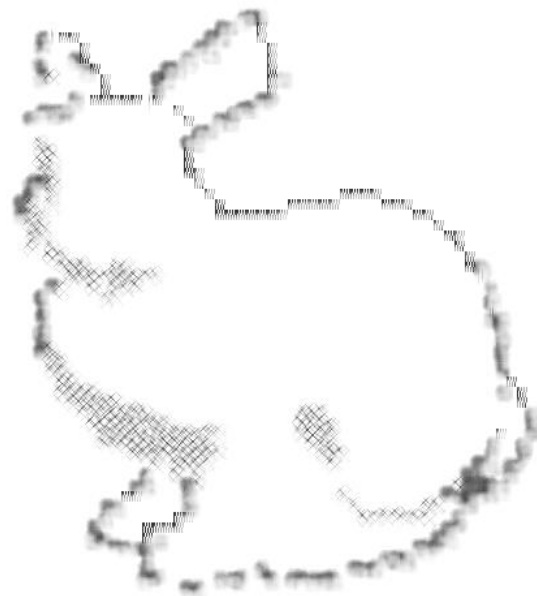
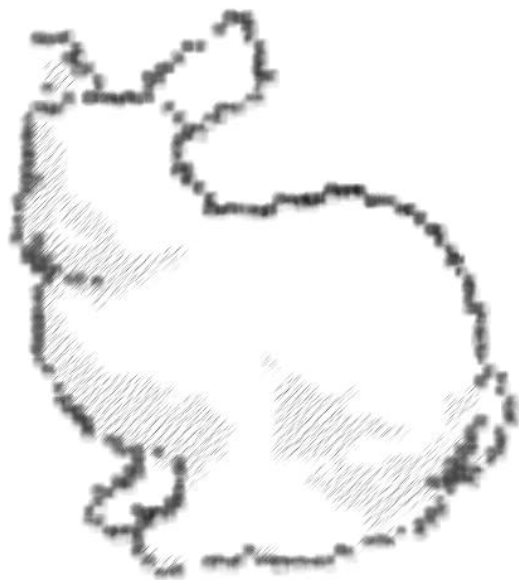
# Applied to other shapes



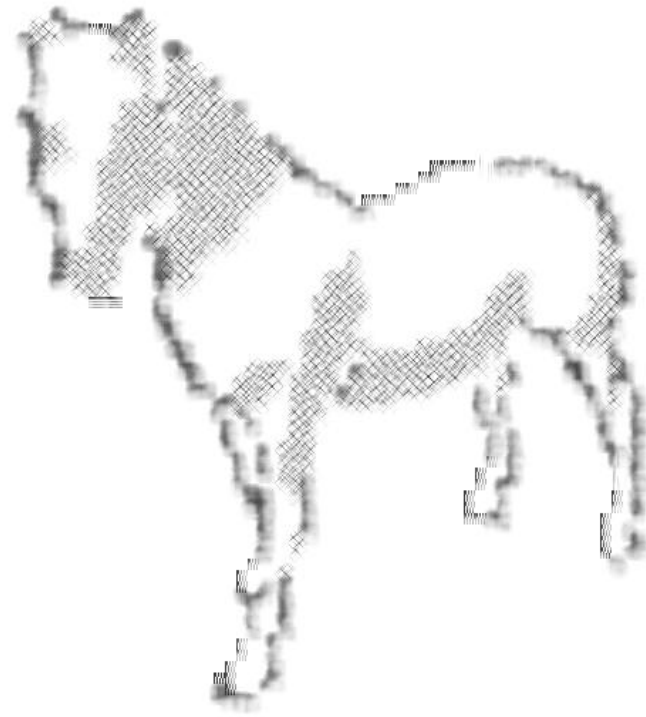
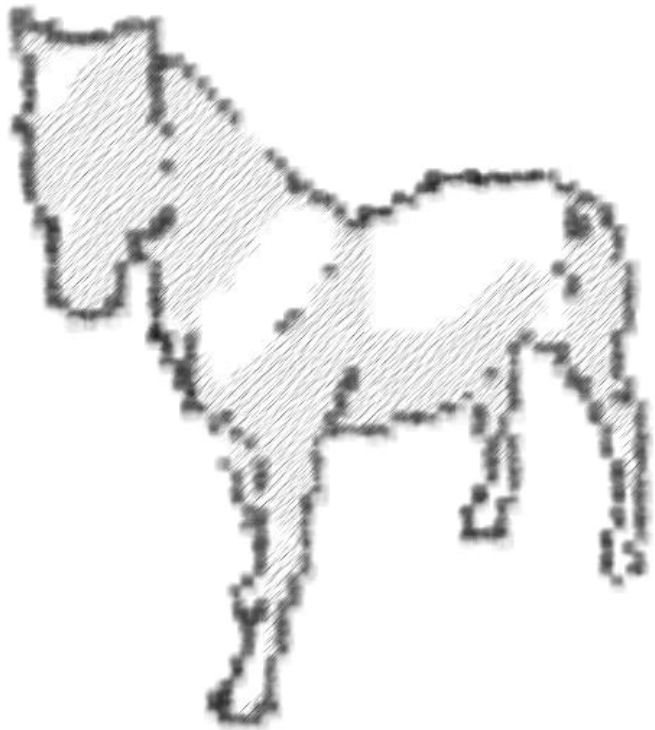
# Capturing different styles



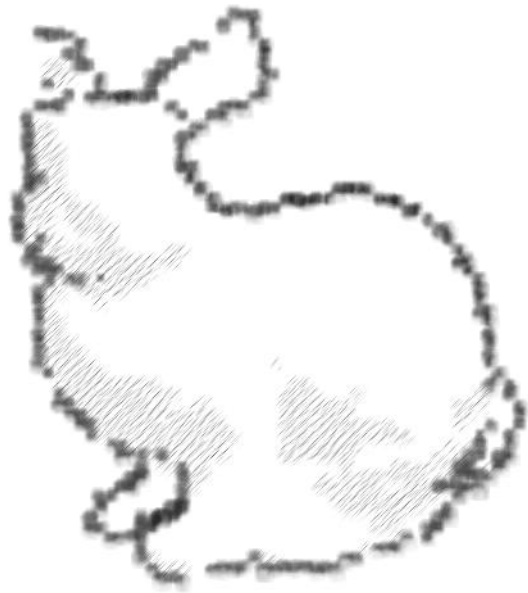
# Style comparison



# Style Comparison

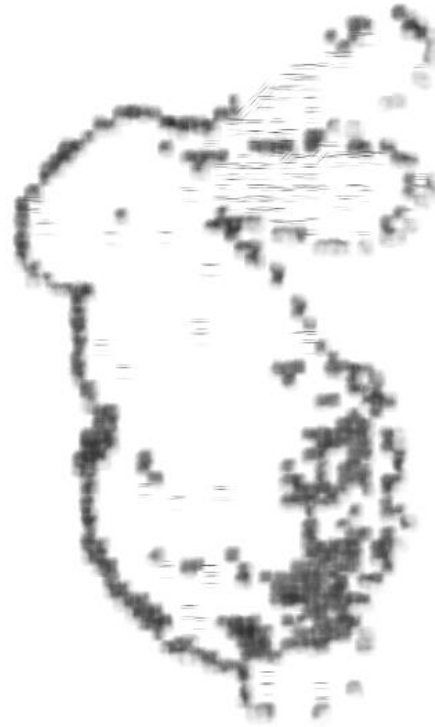


# Neural networks vs. kNN





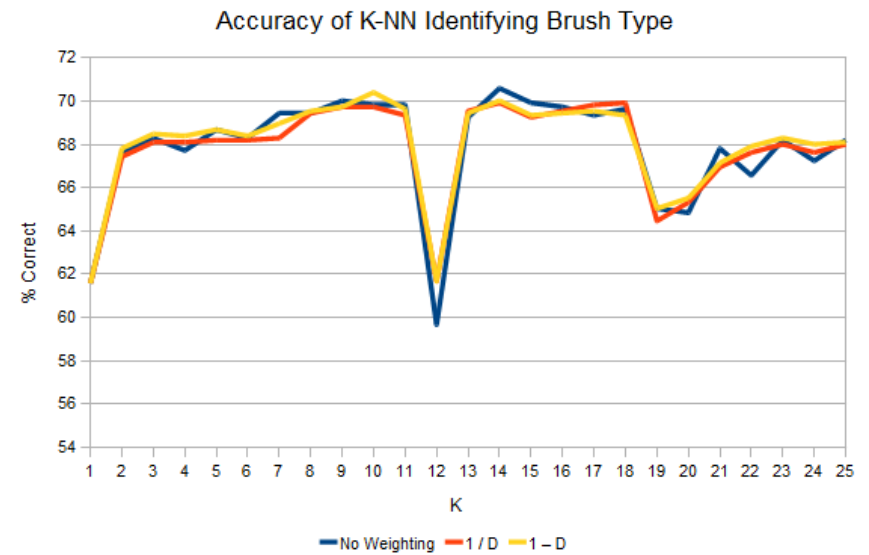
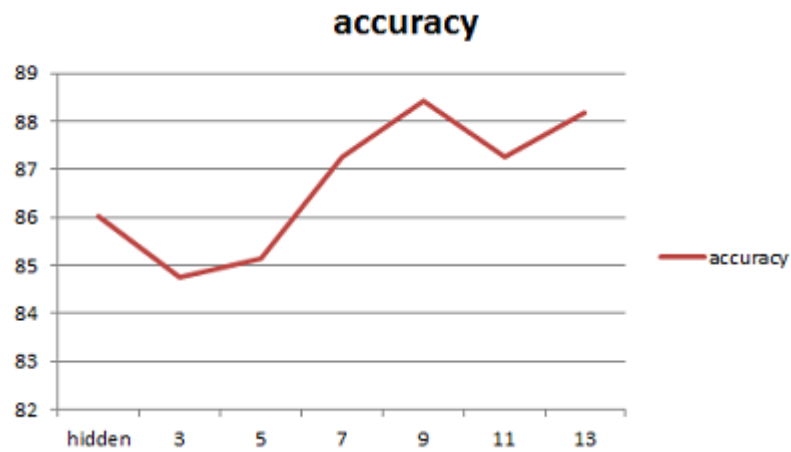
# Neural networks vs. kNN



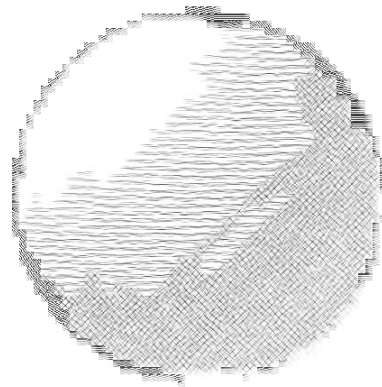
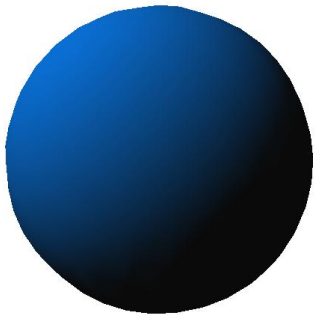
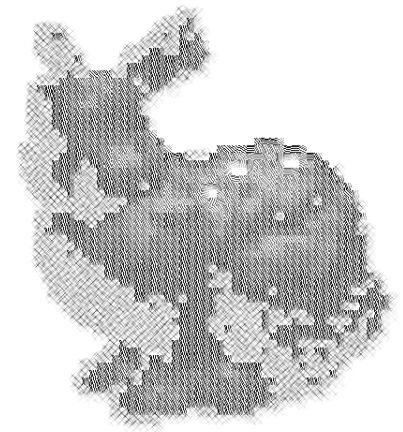
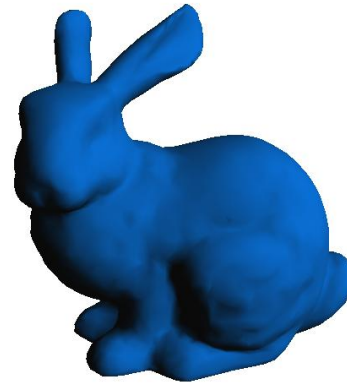
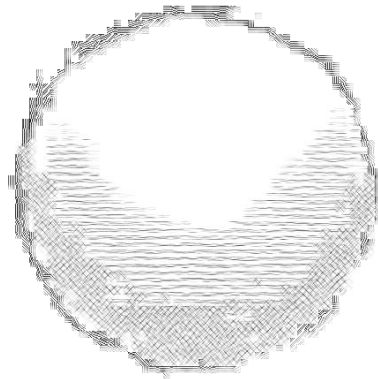
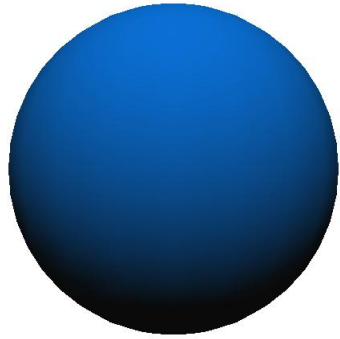
# kNN: Number of neighbors



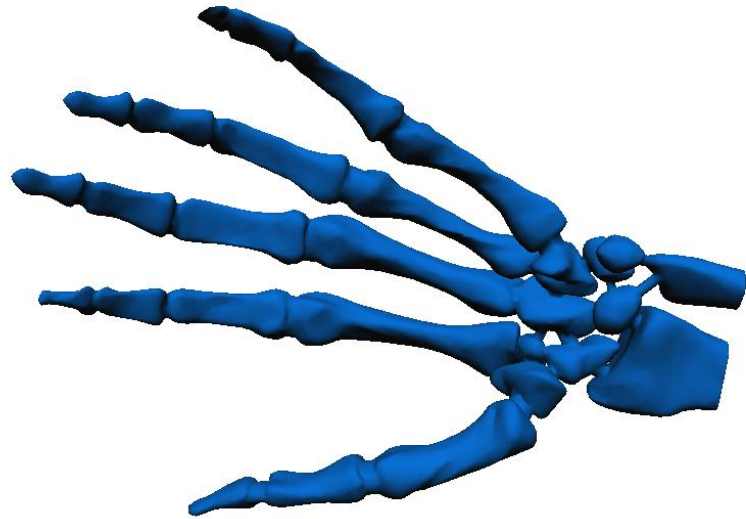
# Accuracy on training data



# The not-so-good results



# The not-so-good results



# Conclusion

- ▶ Successful synthesis of images after learning the style of an artist
- ▶ Neural networks produce more consistent results compared kNN

# Questions?

- ▶ Thank you for coming to the last day of talks!