



NPTEL ONLINE CERTIFICATION COURSES

Course Name: Deep Learning
Faculty Name: Prof. Prabir Kumar Biswas
Department : E & ECE, IIT Kharagpur

Topic

Lecture 01: Introduction

CONCEPTS COVERED

Concepts Covered:

- ☐ Deep Learning: An Introduction
- ☐ Descriptors/ Feature Vectors
- ☐ Machine Learning vs. Deep Learning
- ☐ Discriminative/ Generative Model
- ☐ Challenges
- ☐ Power of Deep Learning



What is learning?



Image Source: Internet

Can You Recognize these Pictures ?



- If Yes, How do you Recognize it?



Image Source: Internet

Origin of Machine Learning?

.....Lies in very early efforts of understanding Intelligence.

- What is Intelligence?
- It can be defined as the ability to comprehend; to understand and profit from experience.
- Capability to acquire and Apply Knowledge.



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Learning?

2300 Years ago....

- Plato (427-347 BC)
- The concept of Abstract Ideas are known to us a priori, through a Mystic connection with world.
- He concluded that ability to think is found in *a priori* knowledge of the concepts.

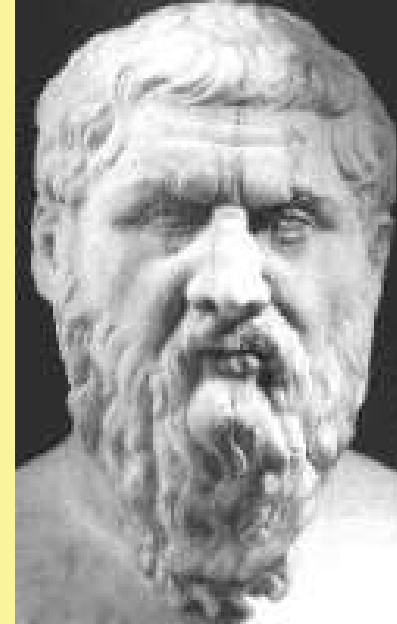


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Learning?

Plato's Pupil...

- Aristotle (384-322 BC)
- Criticized his Teacher's Theory
as it is not taking into account
the important aspect
--- An ability to Learn or Adapt to changing
world.

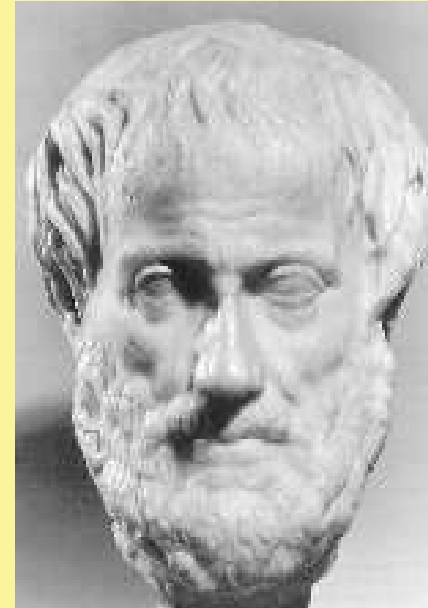


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Descriptors/ Feature Vectors



Image Source: Internet



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52	70	95	23	04	60	11	42	68	54	85	56	01	32	56	71	37	02	36	91
22	31	16	71	51	67	83	89	41	92	36	54	22	40	40	28	66	33	13	80
24	47	37	80	99	03	45	02	44	75	33	53	78	36	84	20	35	17	12	50
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67	26	20	68	02	62	12	20	95	63	94	39	63	08	40	91	66	49	94	21
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86	56	00	48	35	71	89	07	05	44	44	37	44	60	21	58	51	54	17	58
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20	69	36	41	72	30	23	88	34	49	99	69	82	67	59	85	74	04	36	16
20	73	35	29	78	31	90	01	74	31	49	71	48	86	81	16	23	57	05	54
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What the computer sees

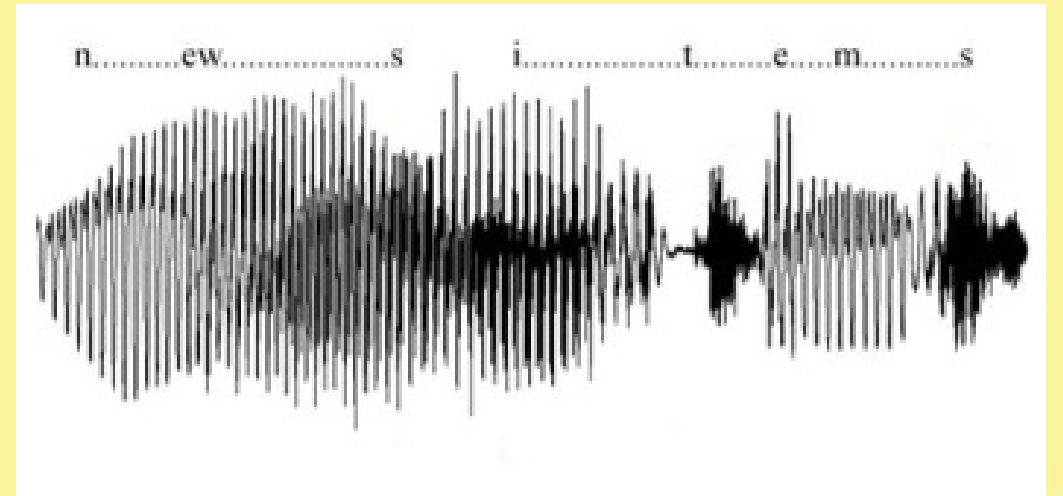


Image Source: Internet

Descriptors/ Feature Vectors



Image Source: Internet

Descriptors/ Feature Vectors

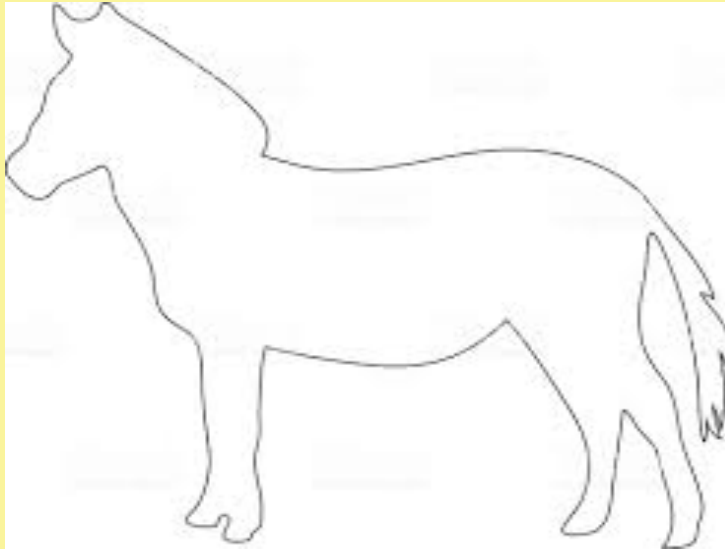
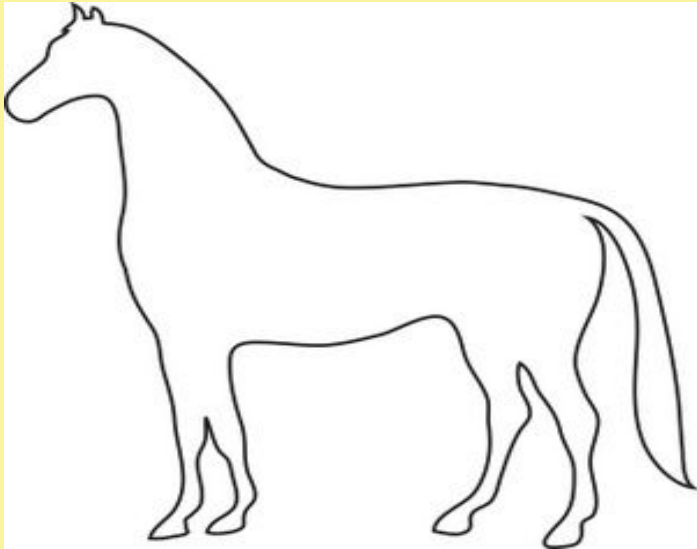


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Descriptors/ Feature Vectors



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Machine Learning vs Deep Learning



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Discriminative vs. Generative Model



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Discriminative Model

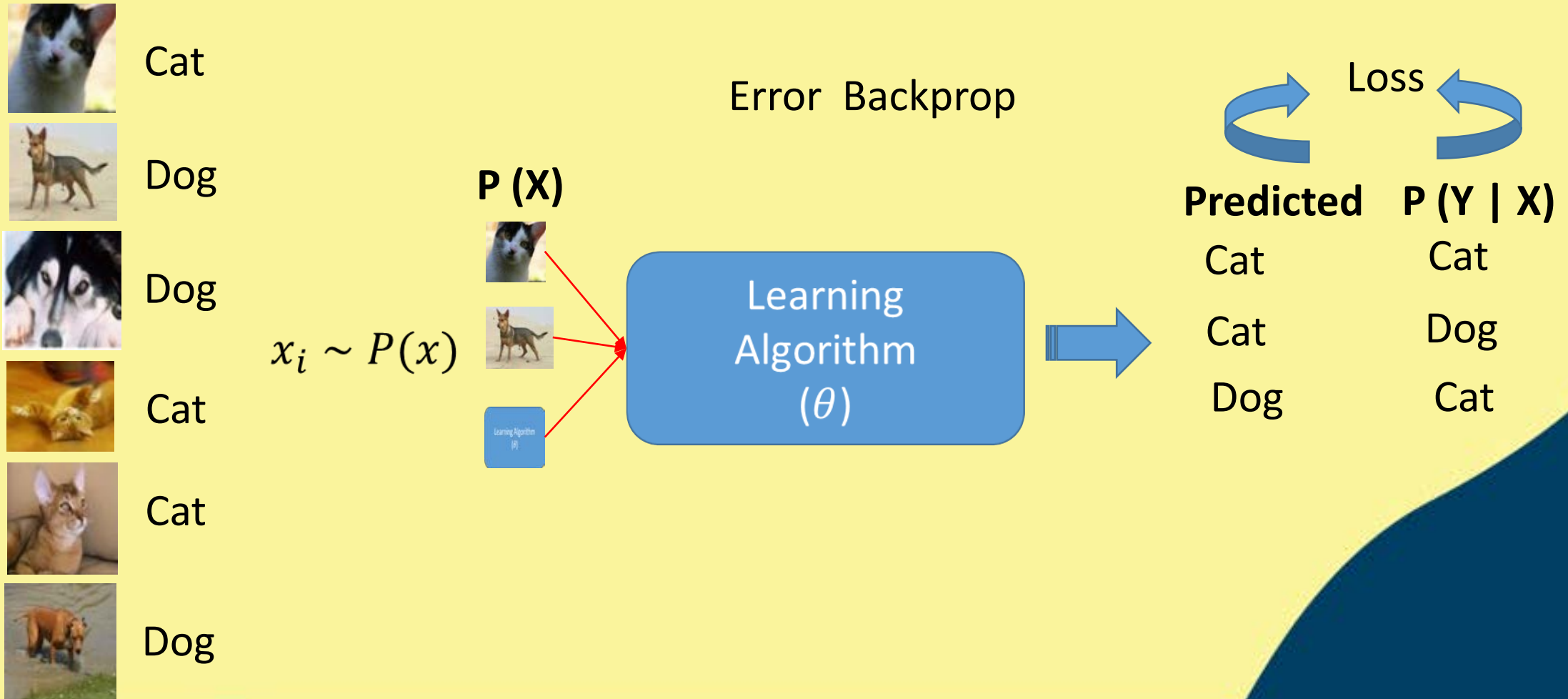


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Generative Model

“What I can not create, I do not understand.”

- Richard Feynman

- ❑ Collect a large amount of data in some domain
- ❑ Train a model to generate data like it.



Challenge s



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Viewing Angle



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Pose

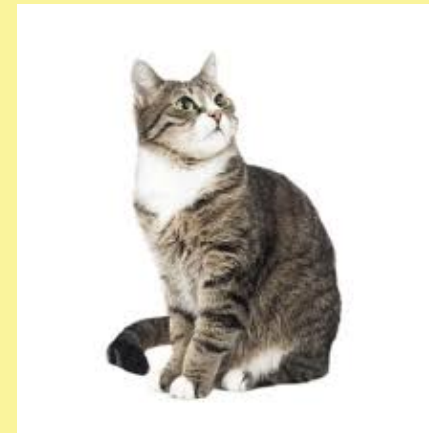


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Illumination



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Intraclass Variation



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Distortion and Occlusion



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Power of Deep Learning

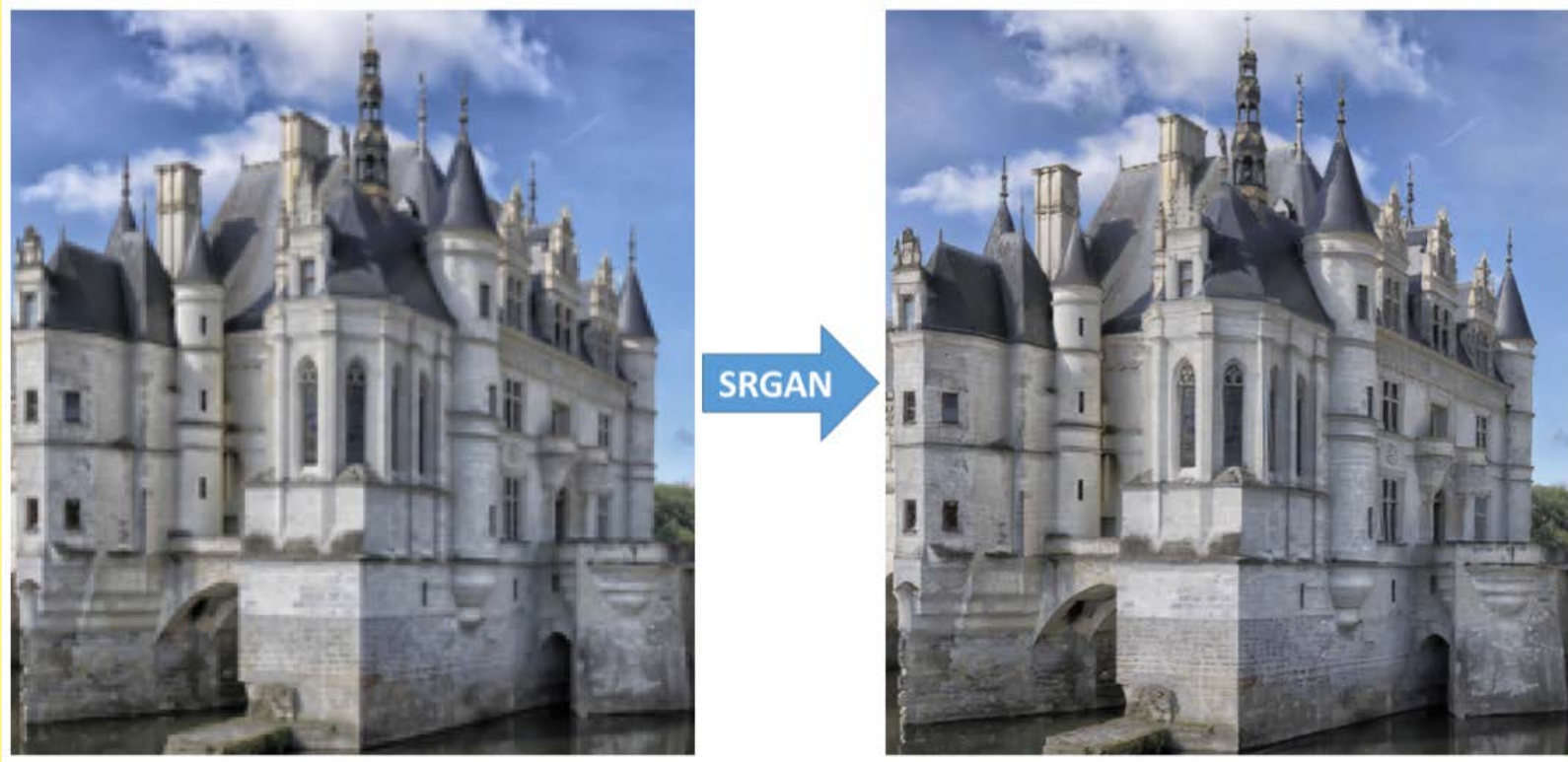


High Resolution Image Synthesis*



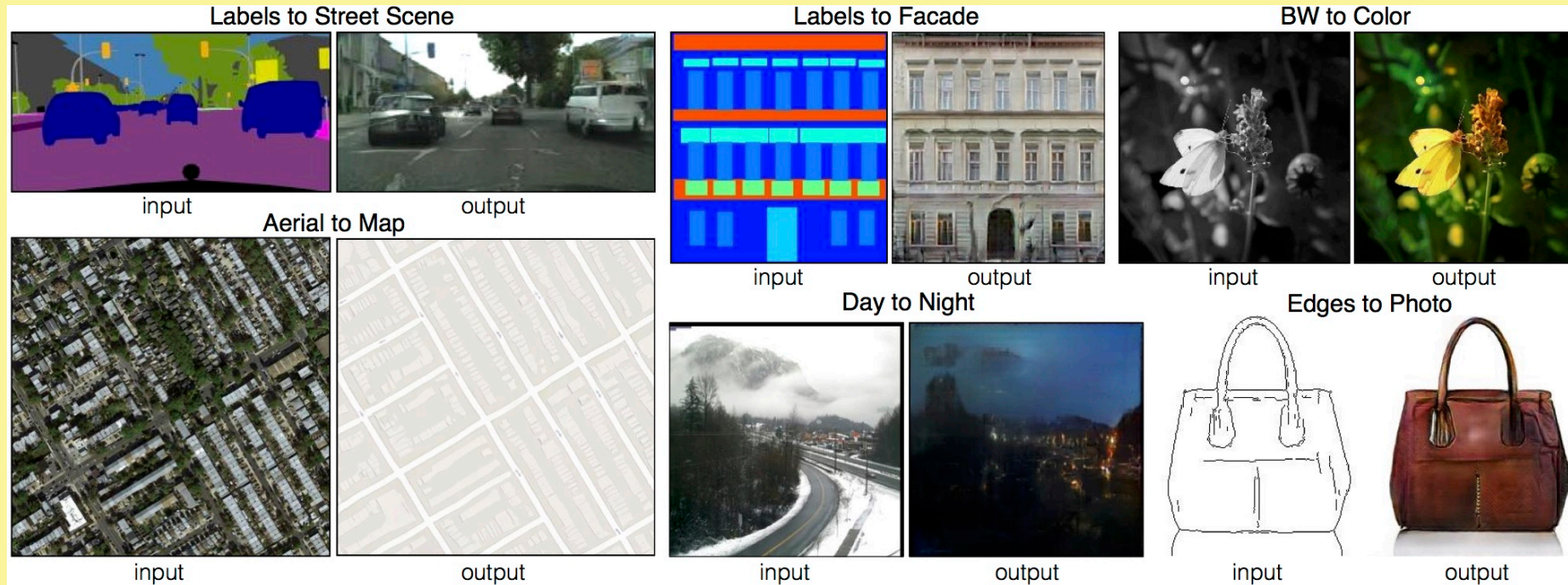
** Karras, Tero, Timo Aila, Samuli Laine, and Jaakko Lehtinen.
"Progressive growing of gans for improved quality, stability,
and variation." ICLR, 2018.*

Image Super resolution*



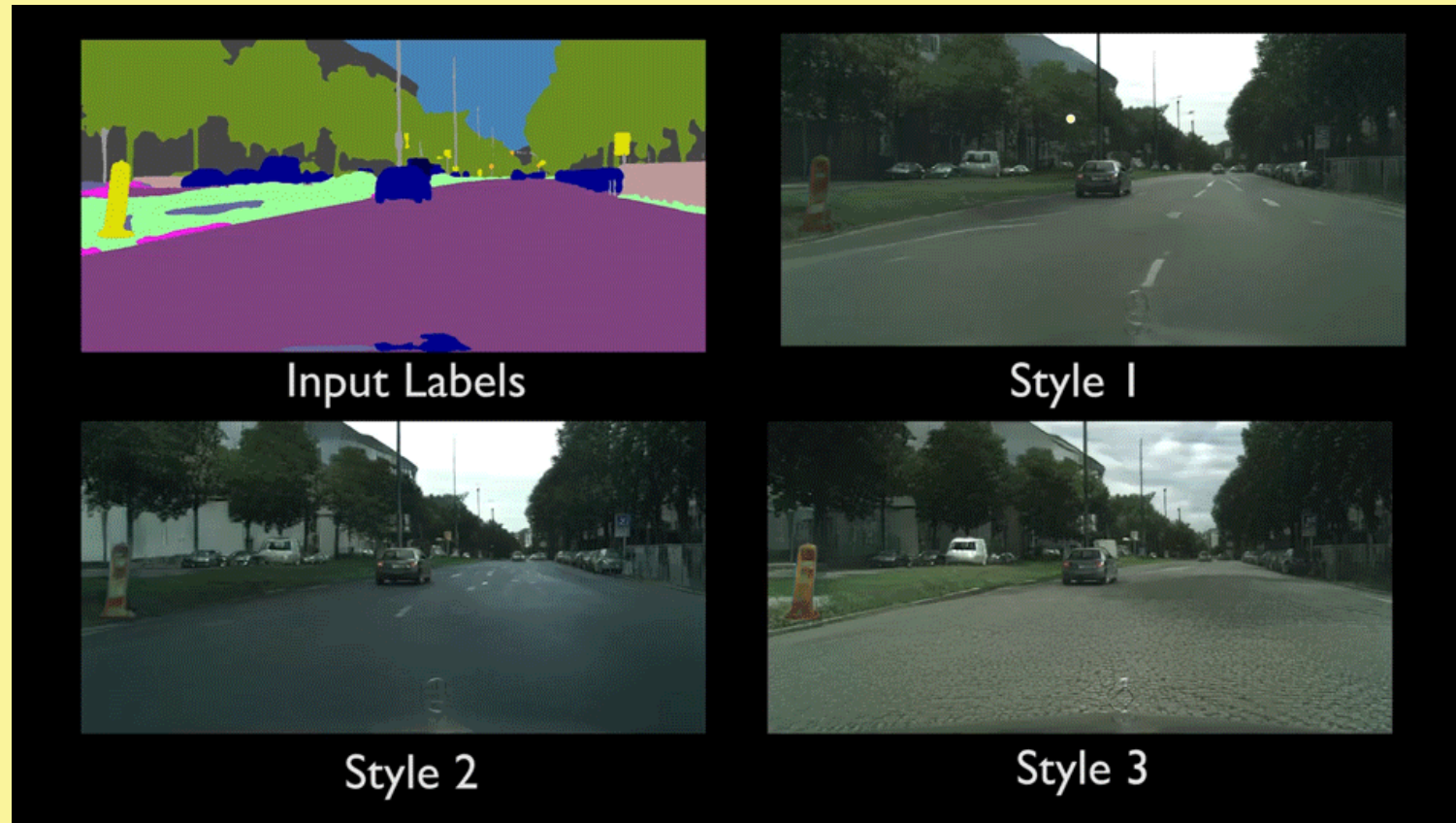
* Ledig et al.. "Photo-Realistic Single Image Super-Resolution Using a Generative Adversarial Network" CVPR 2016

Image to Image Translation*



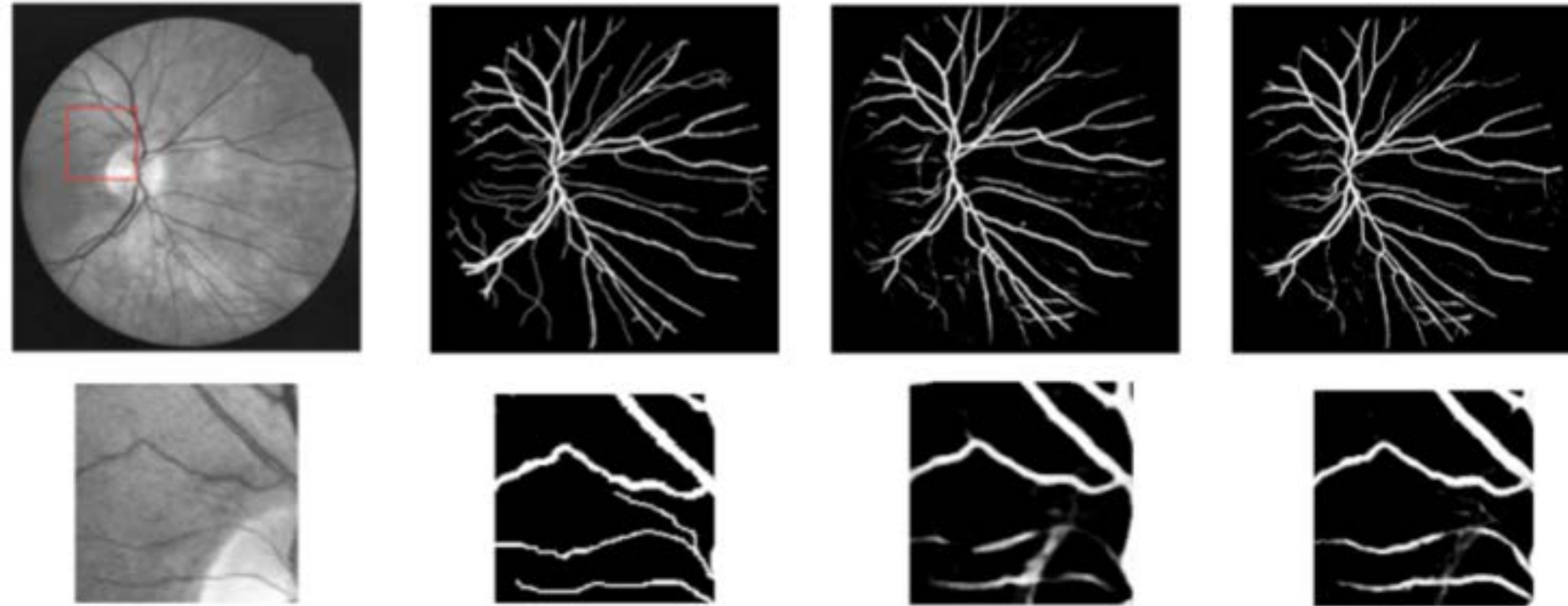
* Isola, Phillip, Jun-Yan Zhu, Tinghui Zhou, and Alexei A. Efros.
"Image-to-image translation with conditional adversarial
networks." *CVPR*, 2017

Video to Video Translation*



*Wang, Ting-Chun, Ming-Yu Liu, Jun-Yan Zhu, Guilin Liu, Andrew Tao, Jan Kautz, and Bryan Catanzaro. "Video-to-video synthesis." *NeurIPS*, 2018

Medical Image Processing





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*Thank
you*

