

Machine Learning

Human Experience Lab

What is Machine Learning?

- teaching a computer to learn?



clipartelek.com

- but what does that mean?

Machine Learning Is...

- developing algorithms that let computers make decisions without explicitly telling them what to do
 - are these intelligent decisions?

Is It Really *Learning*?

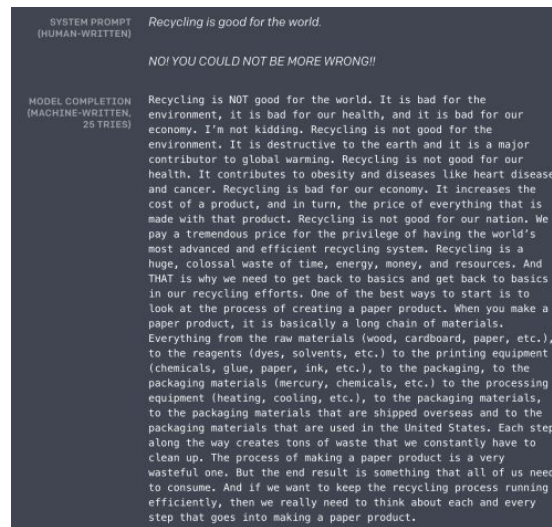
- computers make decisions based on data given to them and only that data
 - still struggle with applying lessons learned in one area to another
- so researchers need a lot of data!
 - the data given to an algorithm can radically change its output

Generating Predictions

- From the realistic ...



(BigGAN by Heriot-Watt University & Google
DeepMind)



(GPT-2 by OpenAI)

<https://medium.com/syncedreview/biggan-a-new-state-of-the-art-in-image-synthesis-cf2ec5694024>

<https://techcrunch.com/2019/02/17/openai-text-generator-dangerous/>

<http://aiweirdness.com/post/182824715257/gpt-2-it-learned-on-the-internet>

Generating Predictions

- ... to the not-so-realistic.

	Dinkwart 343 0.22 0.55
	Le cute White 27.8 0.05 0.93
	Hathole Gray 43.0 0.16 0.57
	Lime Pink 336 0.34 0.91
	Flumfy Gray 34.0 0.15 0.41
	Glicky Gord 40.2 0.51 0.35
	Surper Blue 185 0.11 0.87

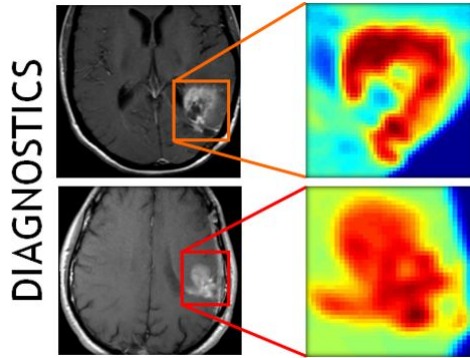
(paint colors)



(pictures of cats)

Real-World Applications

- medical diagnosis



- assessing risk that criminal defendants will reoffend



- managing agricultural irrigation systems



<https://blog.algorithmia.com/vertical-spotlight-machine-learning-for-healthcare-diagnostics/>

<https://www.analyticsindiamag.com/ai-getting-polar-farmers-india-pacing/>
<https://www.agritechtomorrow.com/article/2018/1/artificial-intelligence-and-machine-learning-in-agriculture-today/11139>

How Do You Do All That?

Fields of Machine Learning

- Supervised Learning
- Unsupervised Learning
- Semi-supervised Learning
- Reinforcement Learning
- etc....

Supervised Learning

- Uses labelled data



0: Macaw 1: Conure

- Regression
- Classification

Unsupervised Learning

- Uses unlabelled data



- Clustering

How to analyze results?

- Accuracy/Misclassification Error
- Confusion Matrix
- Precision
- Recall
- F1 Score

Short Example