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Grace Series Talk to UT Dallas

September 2019


the
journey
starts
here...

We start learning when we are born…

- Sounds
- Touch
- Smell
- Reach
- Eat
- Motor skills
- Verbal sounds
- …

Machine Learning Definition

- Alan Turing posed it this way "Can machines think?"
- We now prefer to pose it as "Can machines do what we (as thinking entities) can do?“
- The name *machine learning* was coined in 1959 by Arthur Samuel
- Tom Mitchell’s definition is the one we will use

> *"A computer program is said to learn from experience E with respect to some class of tasks T and performance measure P if its performance at tasks in T, as measured by P, improves with experience E."*
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> -- Tom Mitchell

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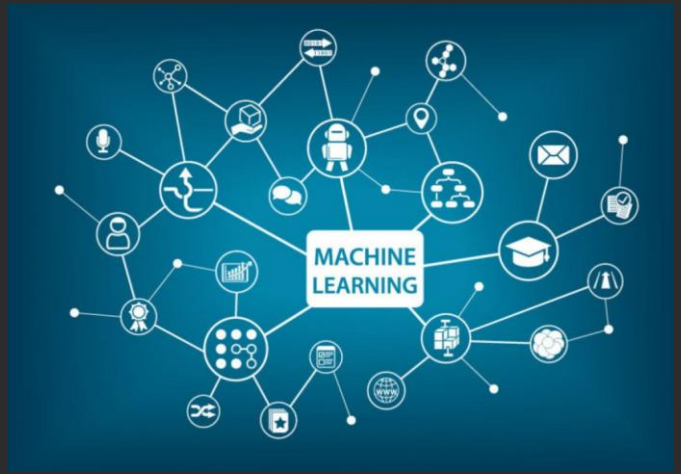
My journey

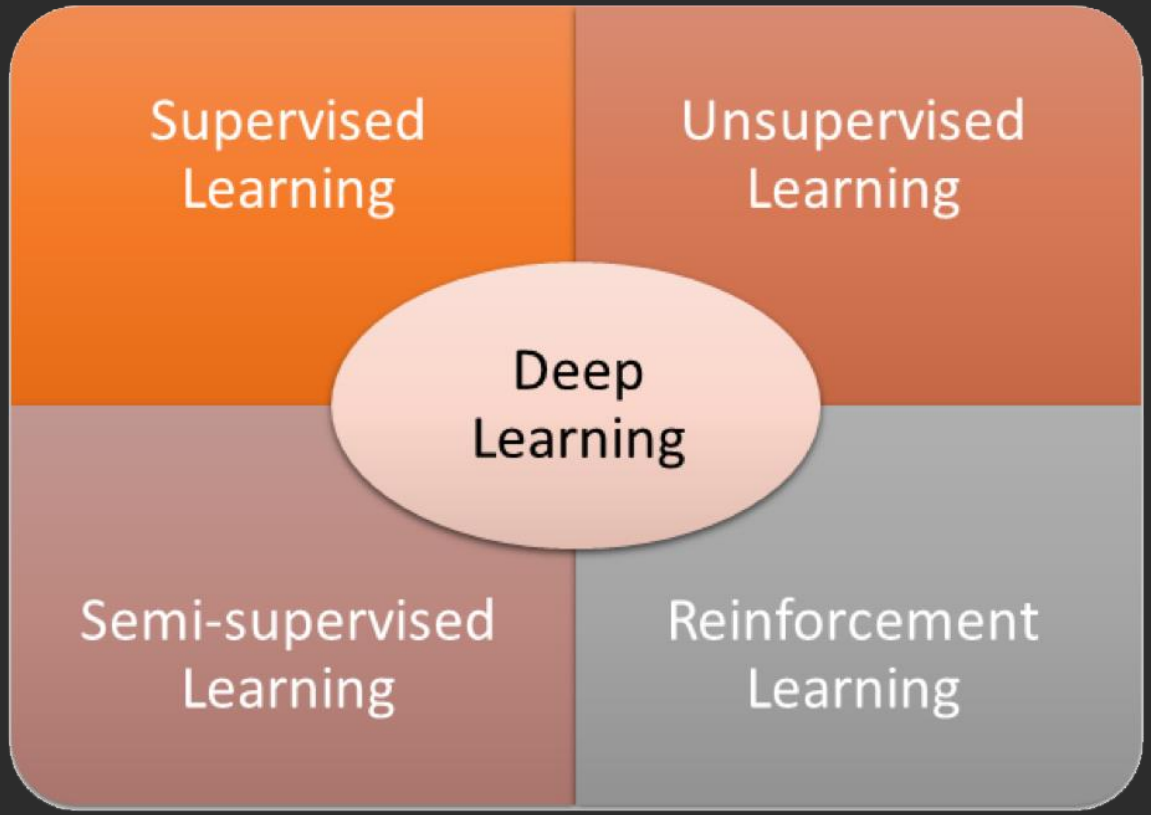
	Work	School
0 to 6		Kid stuff
6 to 15		Elem & Jr High
15 to 17	Part Time	High School
17 to 23	Part Time	Bachelor's & Master's
23 to 28	Full Time	
28-36	Part Time	Master's & PhD
36-49	Full Time	MBA
50+	Best of both	

Categories of Learning

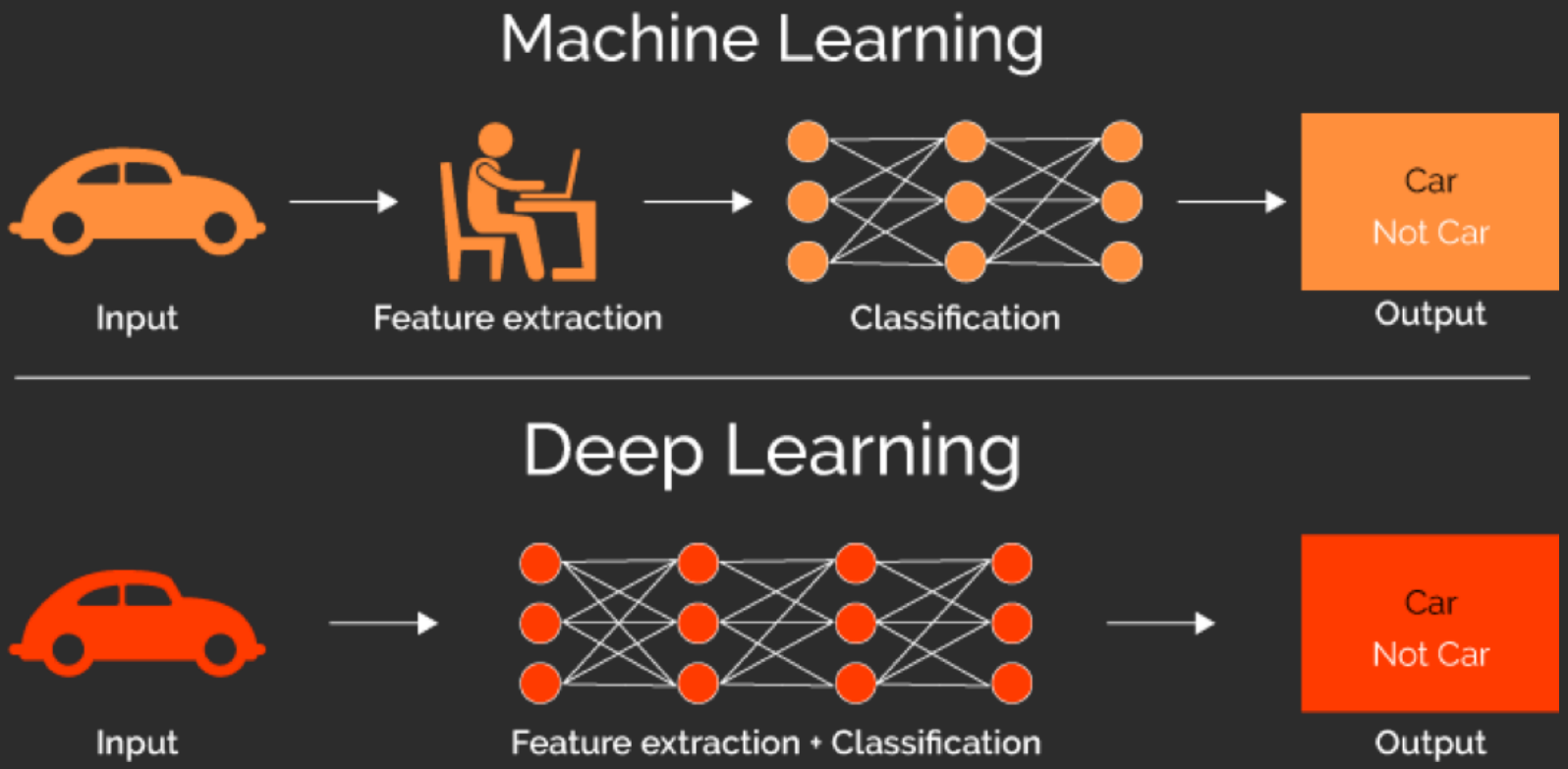
- Supervised Learning
  Input data includes label (desired solution) which is used to "train" the system
- Unsupervised Learning
  Input data is not labeled
- Semisupervised Learning
  Some input data is labeled and some is not
- Reinforcement Learning
  System interacts and receives rewards or penalties based on decisions to determine a strategy (called a policy)



Deep Learning



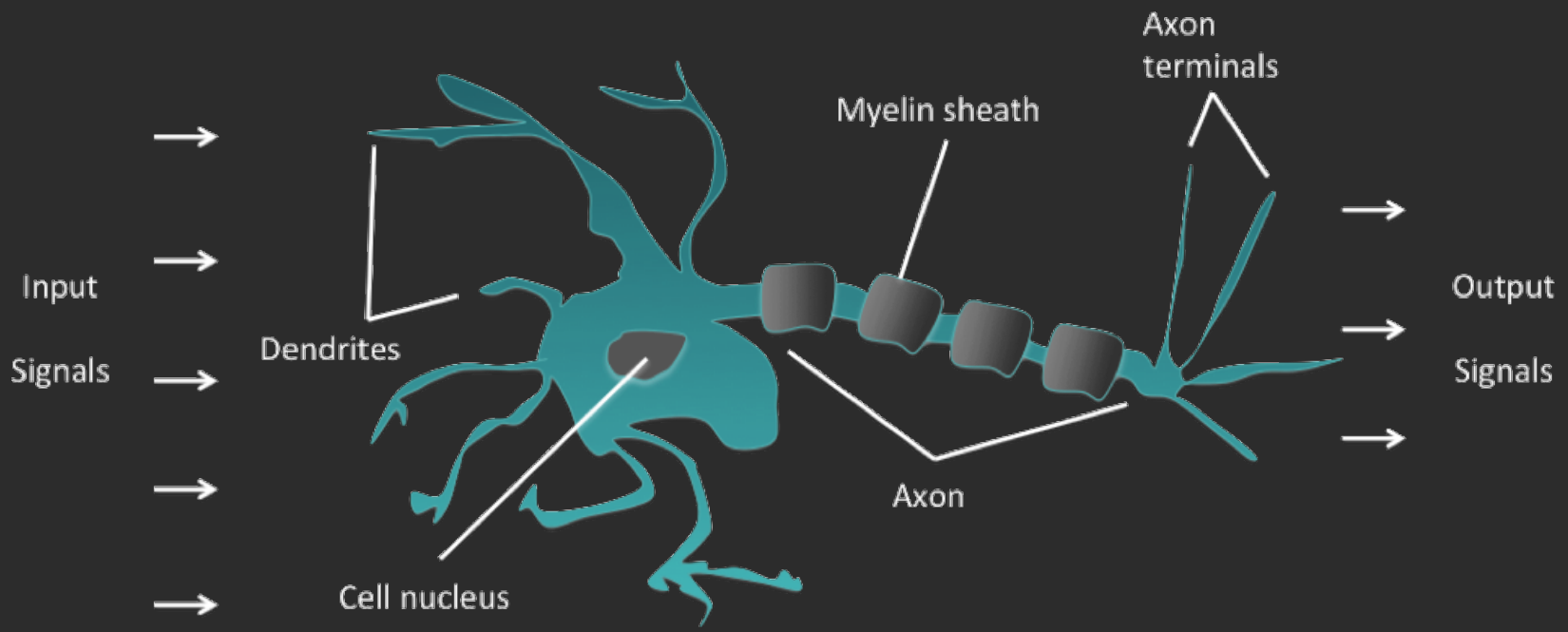
Deep Learning comparison



My journey

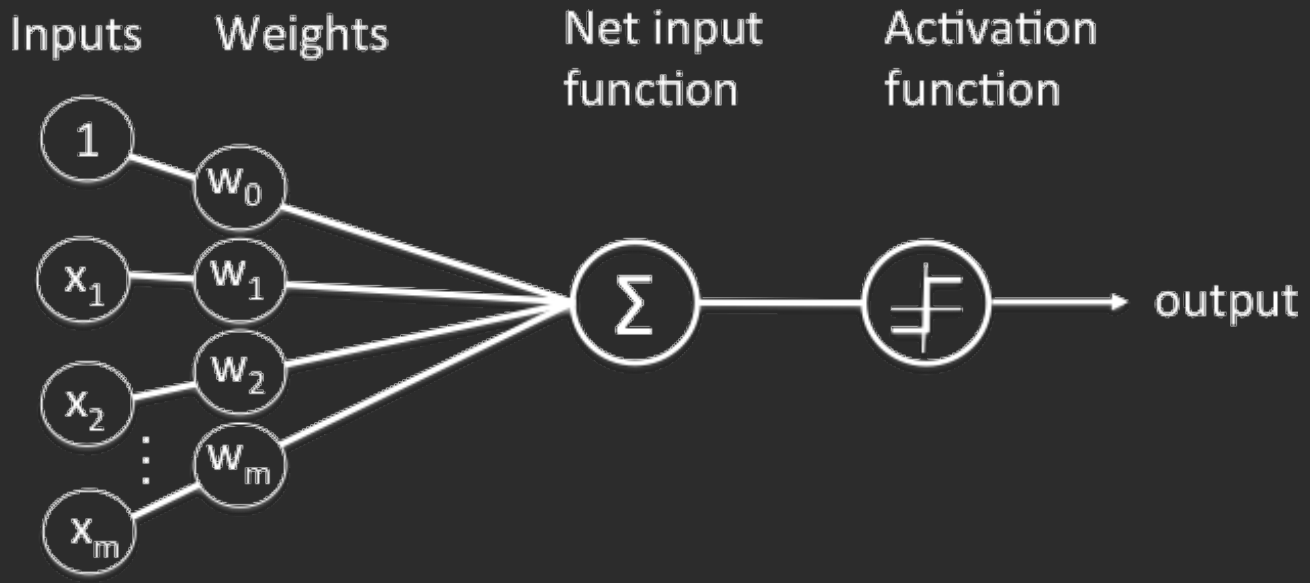
	Work	School	
0 to 6		Kid stuff	Supervised, Unsupervised, Reinforcement
6 to 15		Elem & Jr High	Semisupervised, Reinforcement
15 to 17	Part Time	High School	Semisupervised
17 to 23	Part Time	Bachelor's & Master's	Reinforcement
23 to 28	Full Time		Reinforcement
28-36	Part Time	Master's & PhD	Deep Learning
36-49	Full Time	MBA	Deep Learning
50+	Best of both		????

Perceptrons--Background



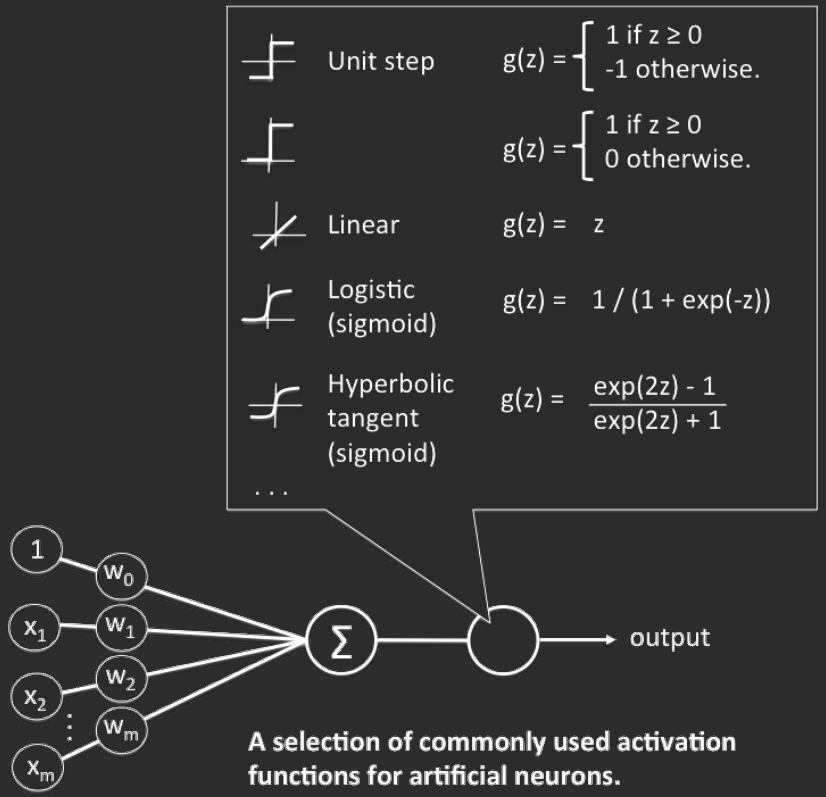
Schematic of a biological neuron.

Perceptron (Artificial Neuron)



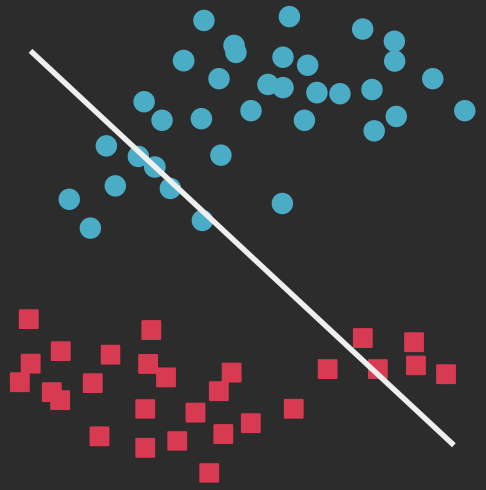
Schematic of Rosenblatt's perceptron.

Common Activation Functions

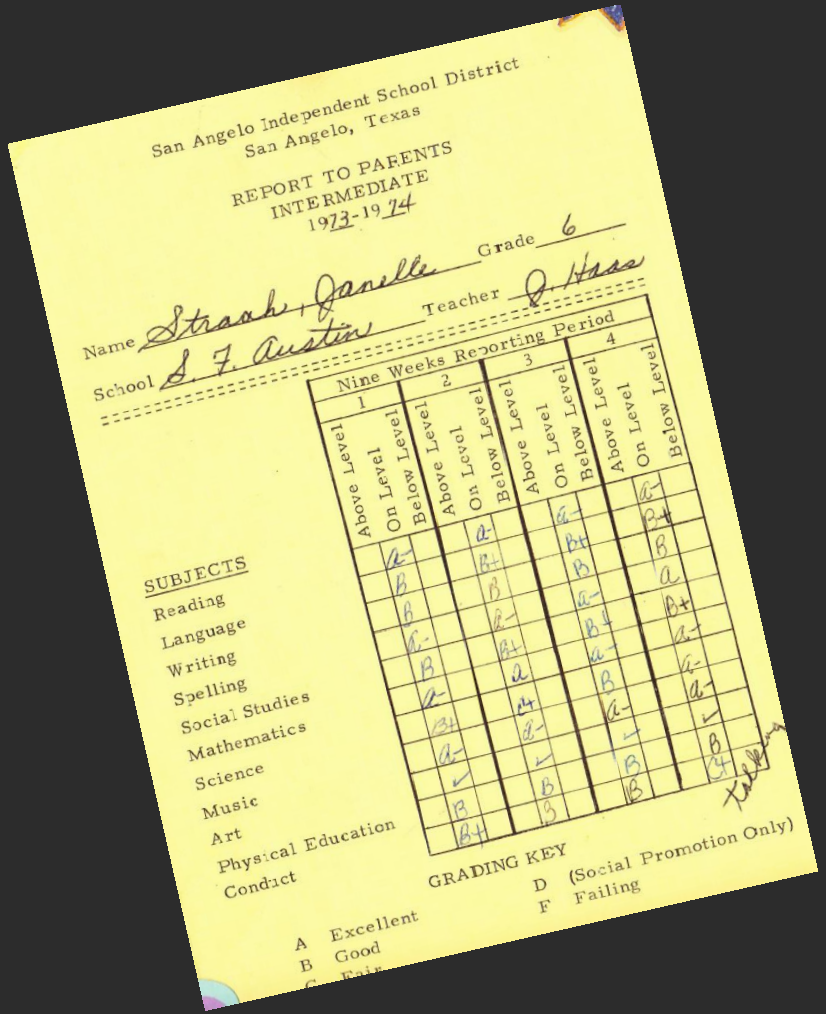


A selection of commonly used activation functions for artificial neurons.

Classification



Classification – My strengths



San Angelo Independent School District
San Angelo, Texas

REPORT TO PARENTS
INTERMEDIATE
1973-1974

Name Strach, Janelle Grade 6
School S. F. Austin Teacher D. Hass

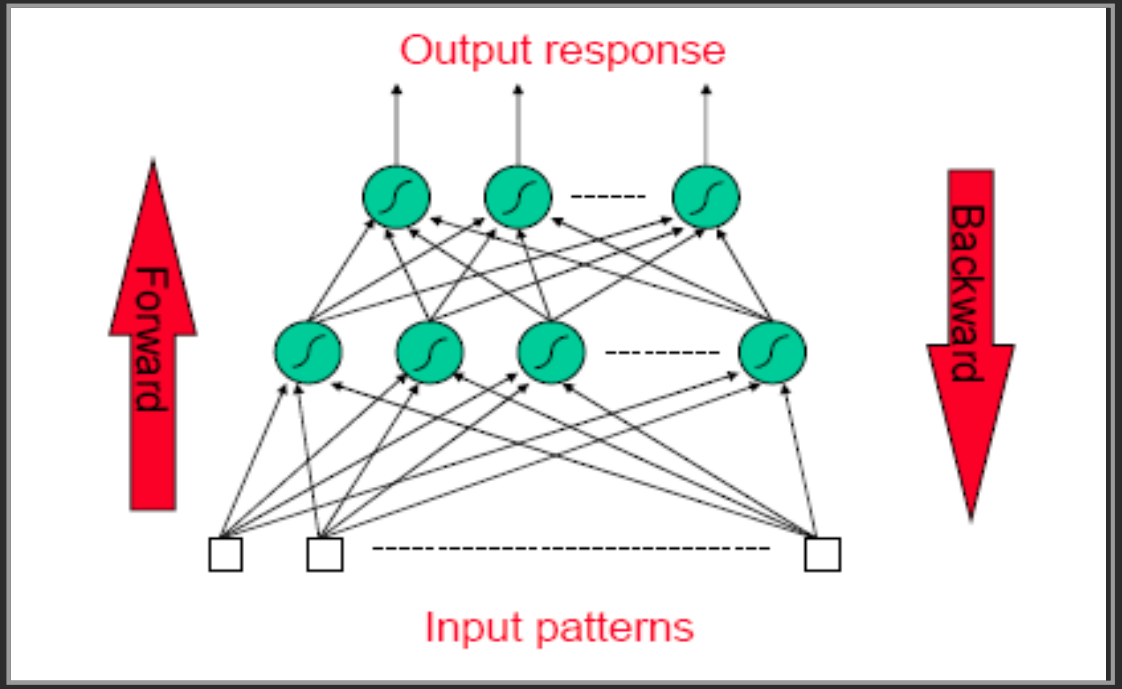
SUBJECTS	Nine Weeks Reporting Period 1			2			3			4		
	Above Level	On Level	Below Level	Above Level	On Level	Below Level	Above Level	On Level	Below Level	Above Level	On Level	Below Level
Reading		A-			A			A-			A	
Language		B			B+			B+			B+	
Writing		B			B			B			B	
Spelling		A-			B-			B-			A	
Social Studies		B			A+			A-			B+	
Mathematics		A-			A			A			A-	
Science		B+			A			B-			A-	
Music		A-			✓			✓			A-	
Art		✓			B			B			✓	
Physical Education		B			B			B			B	
Conduct		B+									B+	

GRADING KEY
A Excellent
B Good
C Fair
D (Social Promotion Only)
F Failing

Things I learned:

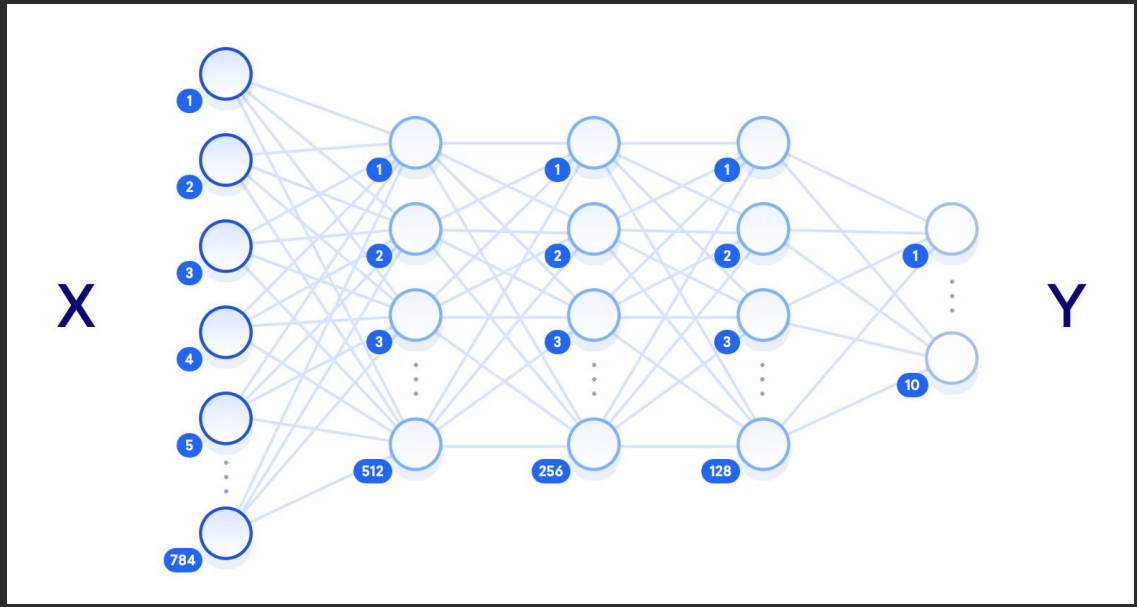
- ✓Most people will add an "e" to the end of my name
- ✓Talking is my strength?

Conceptually: Neural Networks Forward Activity - Backward Error



JS Neural Network Connections

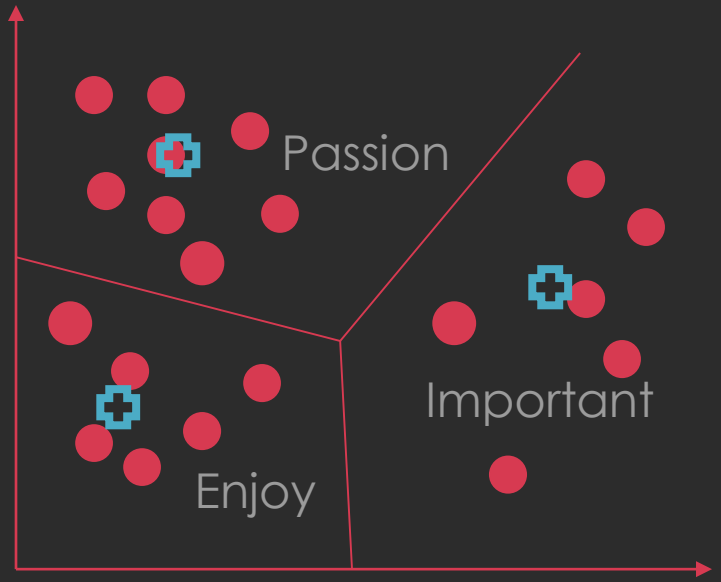
- Friends
- Family
- Work
- Mental Health
- Physical Health
- Personal Growth
- Community
- Security
- etc



Clustering -- k-means algorithm

```
Randomly pick k centroids from the sample points as initial cluster centers
Repeat
    Assign each sample to the nearest centroid
    Move the centroids to the center of the samples that were assigned to it
Until cluster assignments do not change or tolerance or maximum iterations
    reached
```

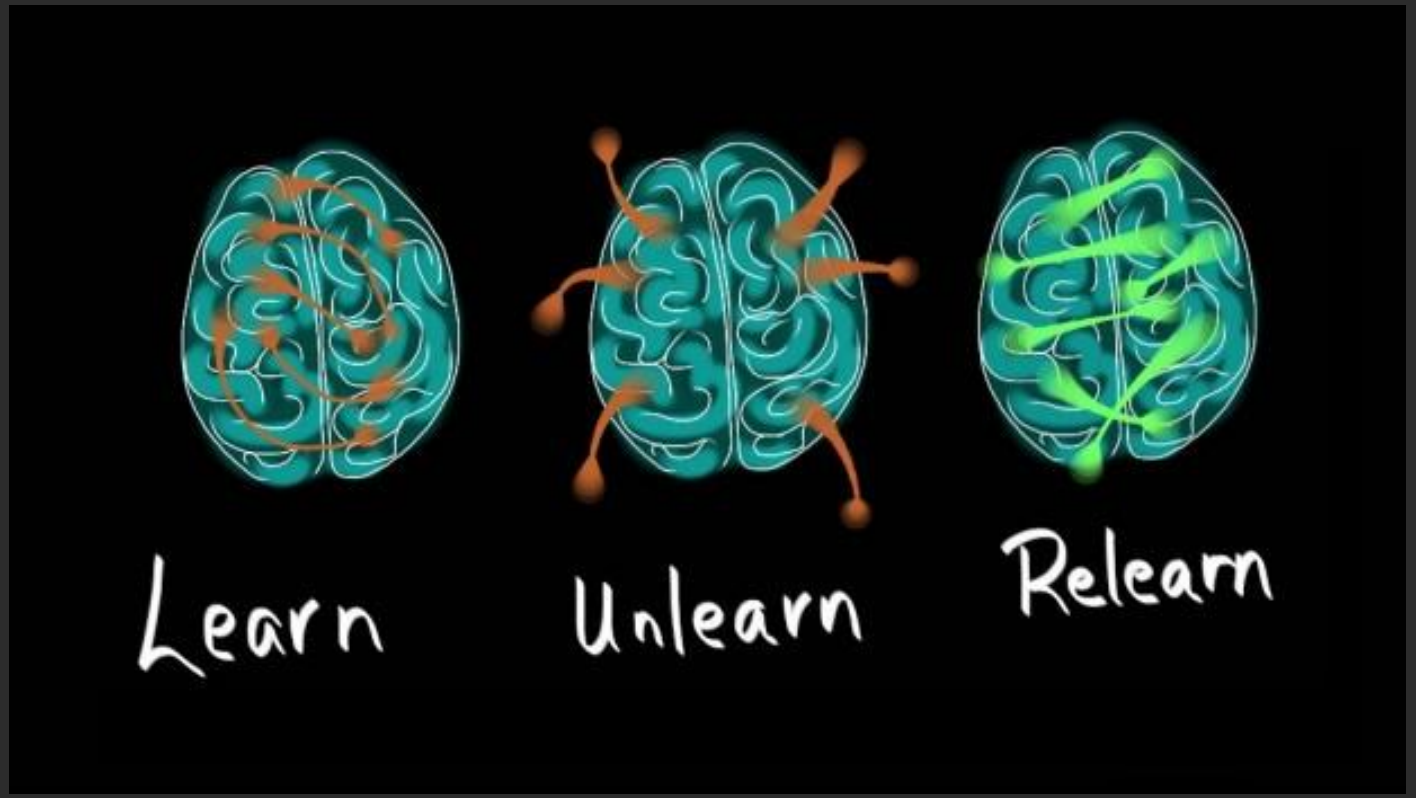
JS Clusters



Some JS Clusters

Enjoy	Passion	Important
Beach	Teaching	Faith
Vacation	Learning	Fairness
Friends	Diversity	Laughter
…	…	…

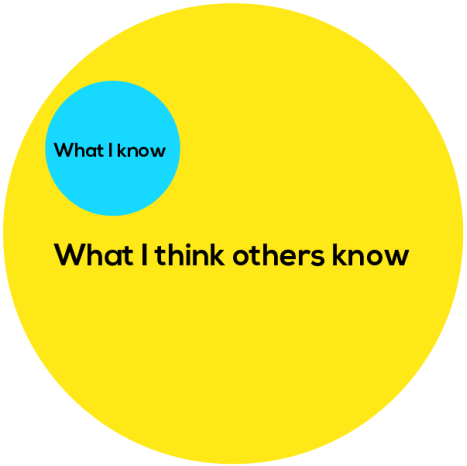
Sometimes…we have to "un"learn



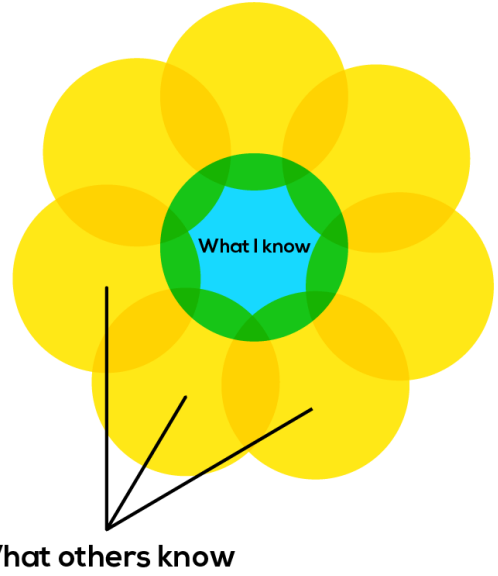
Bias in Machine Learning

- X Boys are not allowed on the top row
- X Only women are allowed to be teachers
- X Girls must wear dresses

Imposter Syndrome



Reality

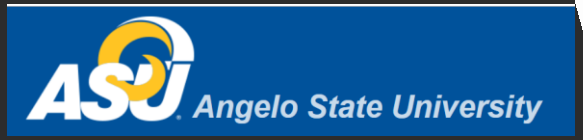



pivot


pivot


A&M


TXU
energy


ASU
Angelo State University


UT DALLAS


IBM


pivot


UT DALLAS


pivot


RICE

- ✓ Never stop learning!
- ✓ Learn your strengths and leverage them!
- ✓ Adjust priorities constantly
- ✓ Sort through the noise in life!
- ✓ Be willing to unlearn things!
- ✓ Embrace pivots!


QUESTIONS
discover
questions
how?
where?
?
why
asking questions
challenge
who?
clues
ask
who?
discover
what?
when?
Knowing
investigation
?
clues
how
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ask
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