

Machine Intelligence



Facebook group: <https://goo.gl/tDaeQk>



Facebook page: <https://goo.gl/ib6y4s>



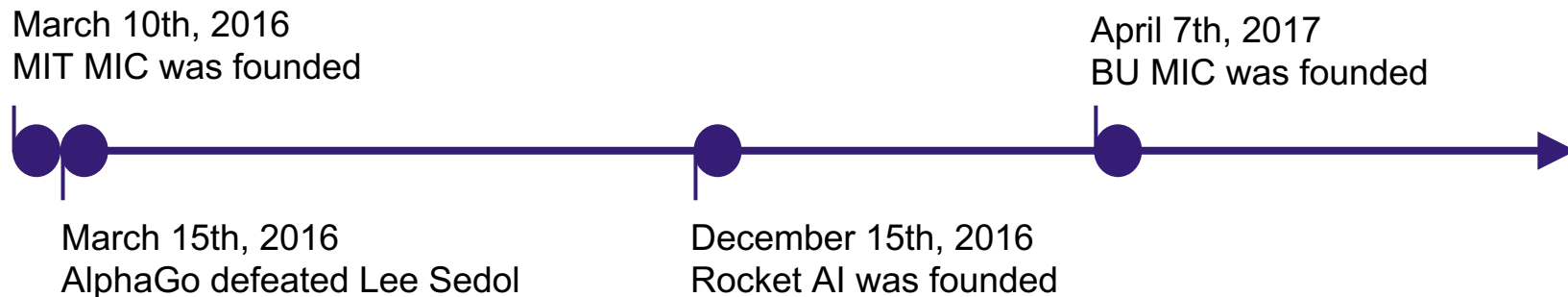
Google Calendar: <https://goo.gl/KHRCxw>

Mailing List: <http://eepurl.com/c2lXqn>



Justin Chen
Sept. 12, 2017

Who are we?



The Machine Intelligence Community is an organization focused on providing opportunities for students to learn about machine intelligence in a community environment.

MIC Origins



Hassan Kane added 2 new photos — with Surya Bhupatiraju and 7 others at  Massachusetts Institute of Technology (MIT). ...

March 10, 2016 · Cambridge, MA · 

Moments like these make being part of the MIT community enjoyable. While AlphaGo is playing against Lee See-dol, a machine learning reading group kicked off and we got to discuss about how AlphaGo works and why it is an important engineering/technical achievement.

If you want more info about the group ping **Aritro Biswas** and join us next Thursday at 5pm in 56-154 to learn more about cutting-edge machine intelligence research and enjoy some good food.





Hassan Kane

March 10, 2016 · Edited · 🌐



Prafulla : "Kids, today we'll talk about value networks and policy networks. Shraman, do you have anything to say about the topic"

Shraman : "Hum, what is Vp again ?"

Surya: "Keep discussing while I'm having all the pizzas for myself hahaha" — with Surya

Bhupatiraju, Prafulla Dhariwal, Aritro Biswas, Jackie Xu, Gary Burnett, Simanta Gautam, Shraman Ray Chaudhuri and Mehmet Efe Akengin.

👍 Like 💬 Comment ➦ Share

👍 😂 😱 Surya Bhupatiraju, Jackie Xu and 19 others



Prafulla Dhariwal What lol thats totally not what happened there 😂

Like · Reply · 👍 5 · March 10, 2016 at 11:44pm



Hassan Kane I had to find nice captions



Like · Reply · 👍 4 · March 10, 2016 at



MACHINE INTELLIGENCE
COMMUNITY

BUMIC Circa May 3rd, 2017



MIT + BU MIC Get Sushi



Core Values

Openness

Disseminating knowledge
and resources

Education

Distilling and teaching
machine intelligence

Community

Connecting with
likeminded peers



Goal of workshop series

1. Introduce the field of deep learning
2. Familiarity with terminology, history, concepts, current events, and papers
3. Learn how to read research papers
4. Meet others interested in machine intelligence
5. Develop skill-set to start your own deep learning projects

Workshop topics

Machine Intelligence	9.12.2017
Gradient-Based Learning	9.19.2017
Neural Networks	9.26.2017
Regularization	10.3.2017
Compositional Data	10.10.2017
Transfer Learning	10.17.2017
Sequential Data	10.24.2017
Deep Reinforcement Learning	10.31.2017
Unsupervised Learning	11.14.2017
Neural Style Transfer	11.28.2017



What is Artificial Intelligence?



Thinking humanly - “[The automation of] activities that we associate with human thinking, activities such as decision-making, problem solving, learning ...” (Bellman, 1978)

Thinking rationally - “The study of the computations that make it possible to perceive, reason, and act.” (Winston, 1992)

Acting humanly - “The study of how to make computers do things at which, at the moment, people are better.” (Rich and Knight, 1991)

Acting rationally - “Computational Intelligence is the study of the design of intelligent agents.” (Poole et al., 1998)



What is Machine Learning?

Coined by Arthur
Samuel in 1959

“Giving machines the
ability to learn without
explicit programming”

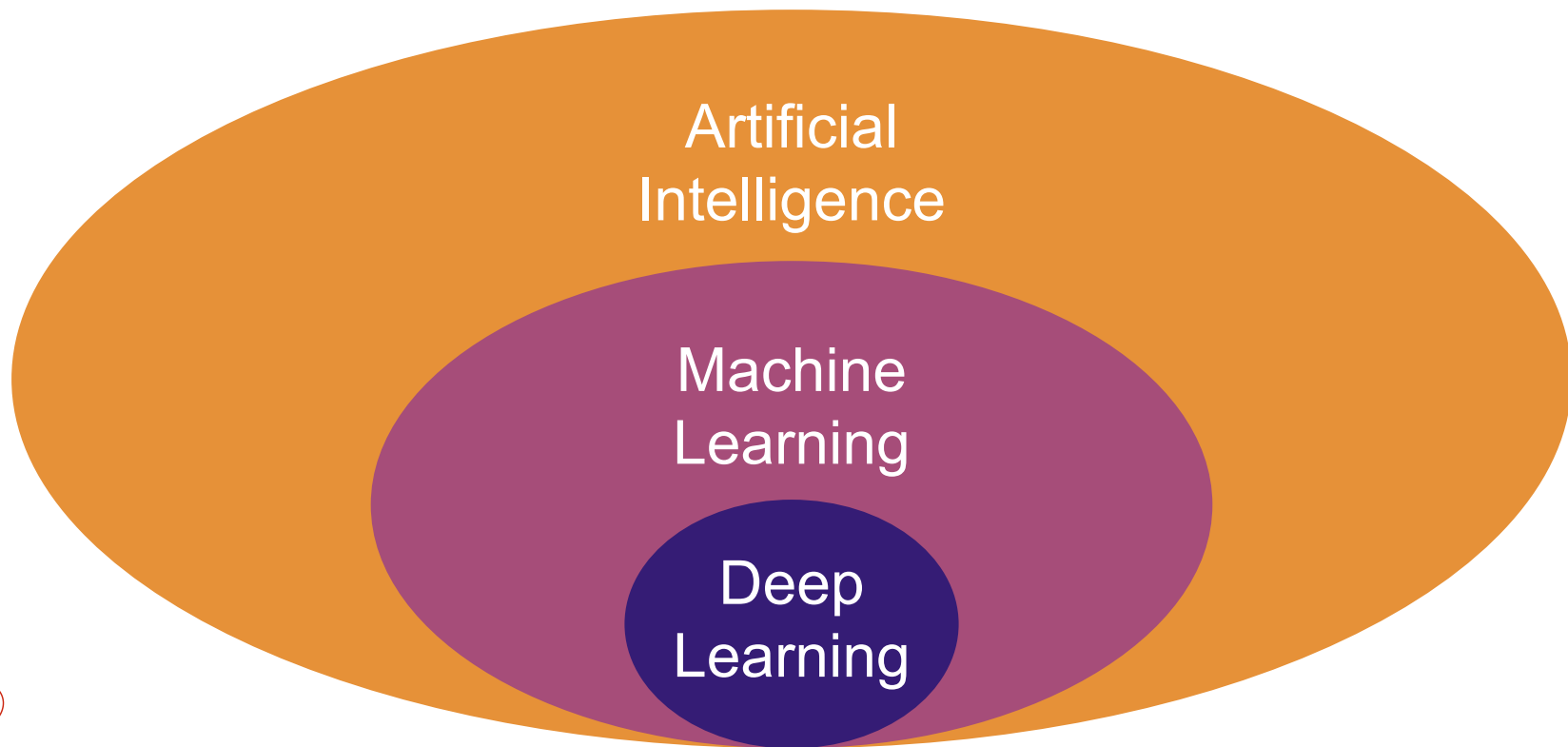
Applied statistics

Data-driven

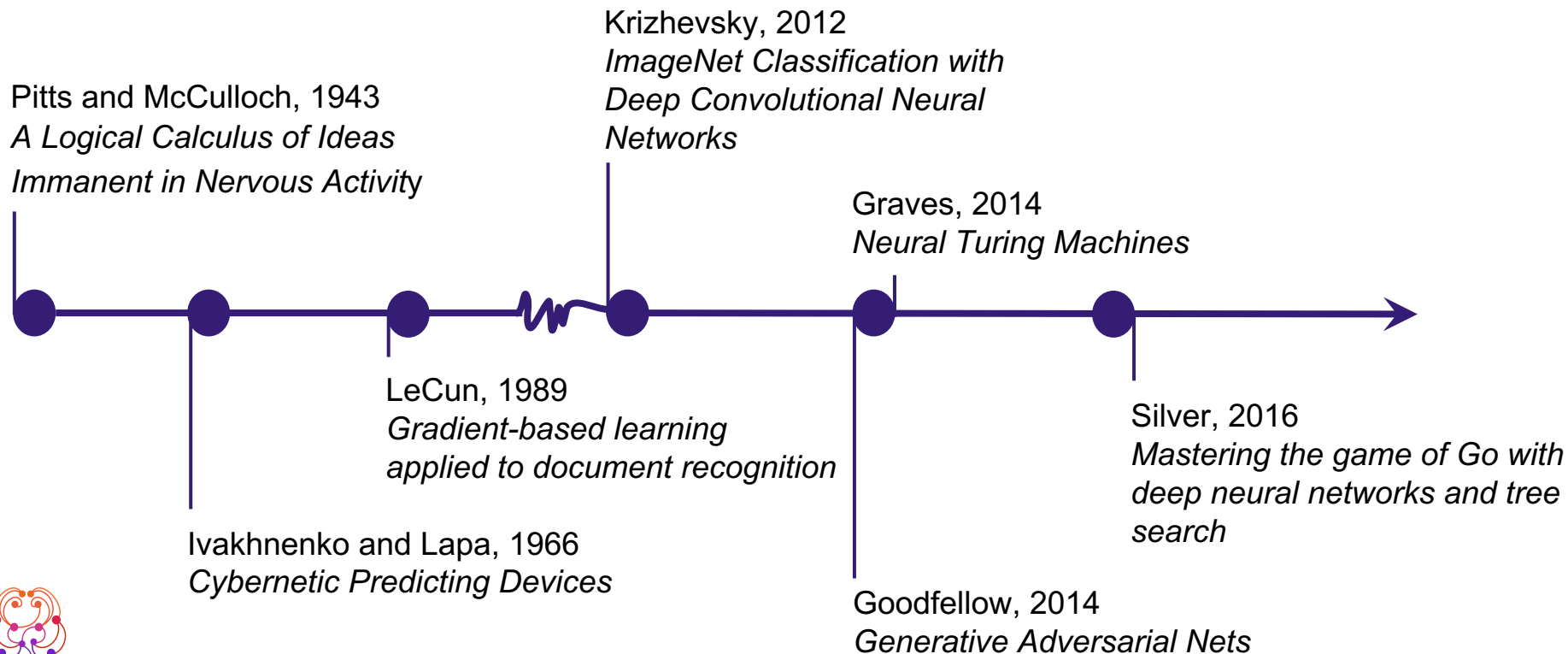
Prediction



What is Deep Learning?



What is Deep Learning?



But Really...What is Deep Learning?

Calculus $\theta_j := \theta_j - \alpha \frac{\partial}{\partial \theta_j} J(\theta)$

Linear Algebra
$$\begin{bmatrix} x_{11} & x_{12} & x_{13} & \dots & x_{1n} \\ x_{21} & x_{22} & x_{23} & \dots & x_{2n} \\ \vdots & \vdots & \vdots & \ddots & \vdots \\ x_{d1} & x_{d2} & x_{d3} & \dots & x_{dn} \end{bmatrix}$$

Probability/ Statistics
$$P(y = j|x) = \frac{e^{x^T w_j}}{\sum_{n=1}^N e^{x^T w_n}}$$

Optimization Theory
$$J(\theta) = \frac{1}{2} \sum_{i=1}^m (h_{\theta}(x^{(i)}) - y^{(i)})^2$$

Learning Theory
$$Q_{\hat{\pi}}(s_t, a_t) = \mathbb{E}[R_t + \lambda \max_a Q_{\hat{\pi}}(S_{t+1}, a)]$$

Where is Deep Learning?



Microsoft



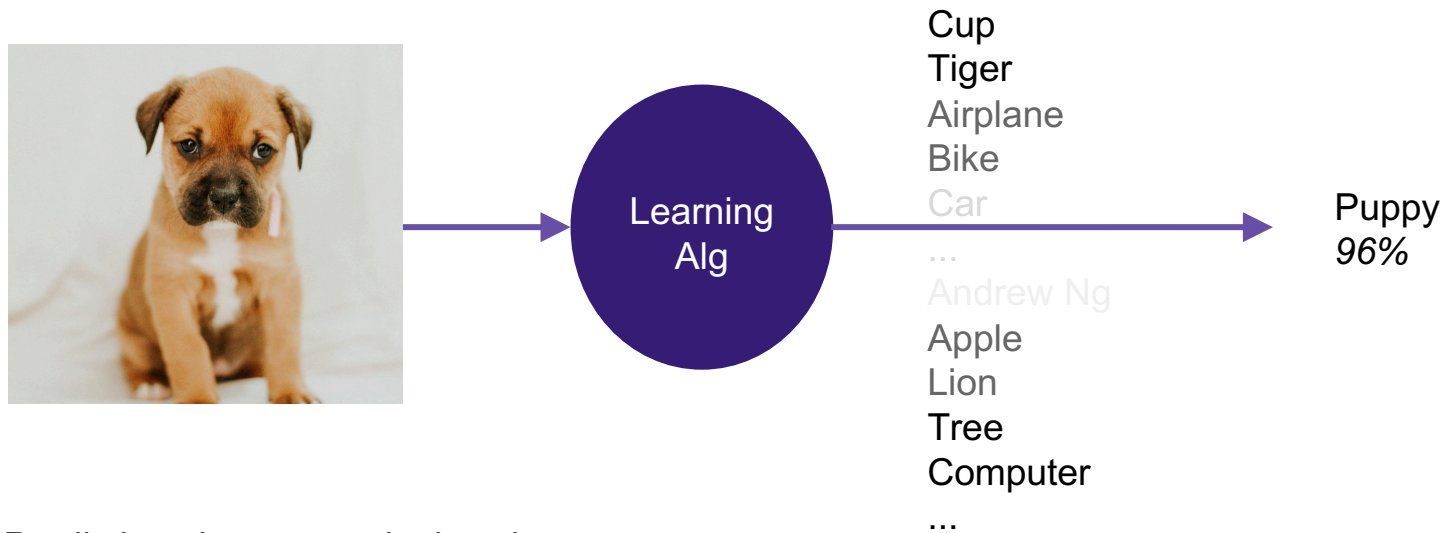
Tencent 腾讯



SONY



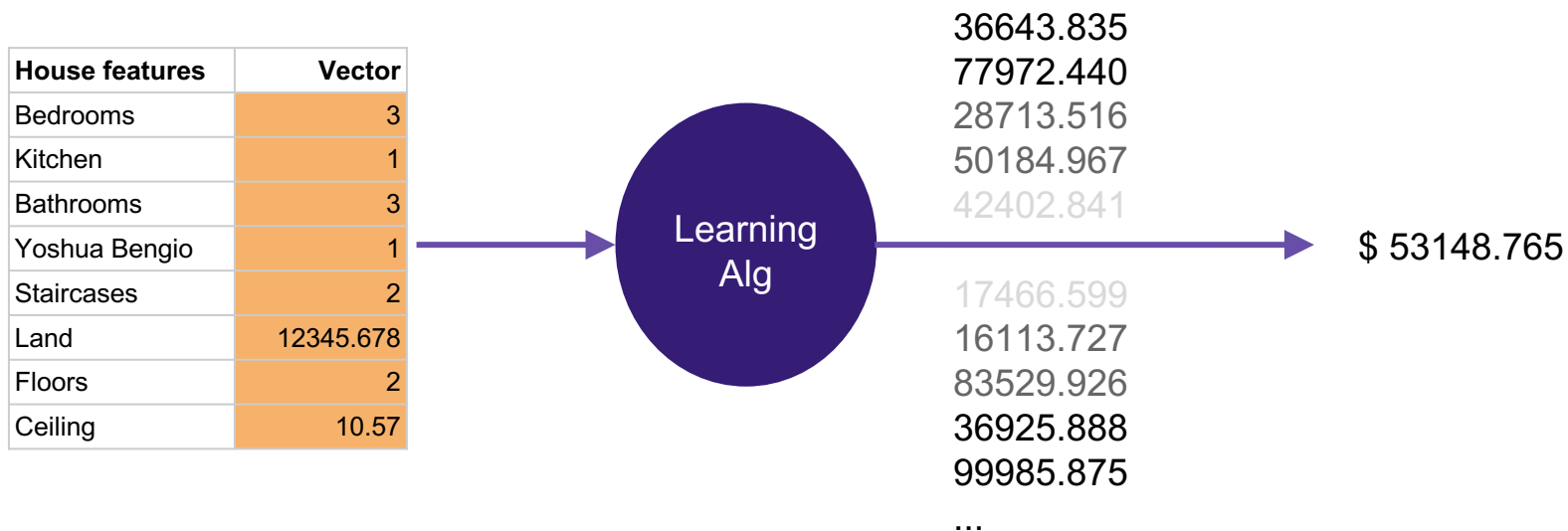
Things Machines Can Learn: Classification



Predicting classes, each class is a discrete value

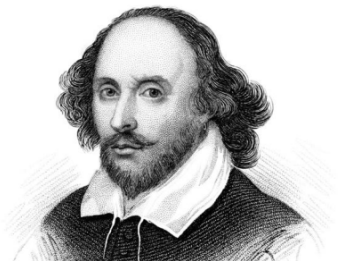
Photos by Jaq

Things Machines Can Learn: Regression

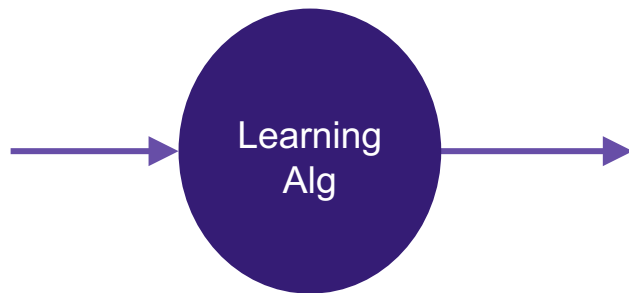


Predicting continuous real values

Things Machines Can Learn: Generation



*Do you bite your
thumb at us, sir?*



PANDARUS:

Alas, I think he shall be come
approached and the day When little
srain would be attain'd into being
never fed, And who is but a chain
and subjects of his death, I should
not sleep. Second

Senator:

They are away this miseries,
produced upon my soul, Breaking
and strongly should be buried,
when I perish The earth and
thoughts of many states.

Geoffrey Hinton: Well, your wit is in
the care of side and that.

...

Modeling and generating original
distribution

http://images.indianexpress.com/2016/05/shakespeare_759_thin_kstock.jpg

How Does One Learn?

Supervised - labeled dataset

Semi-supervised - partially labeled dataset

Unsupervised - unlabeled dataset

Reinforcement - punishment and reward

Meta - learning to learn

Transfer - use learned parameters from a similar task

Generation 0

Dataset

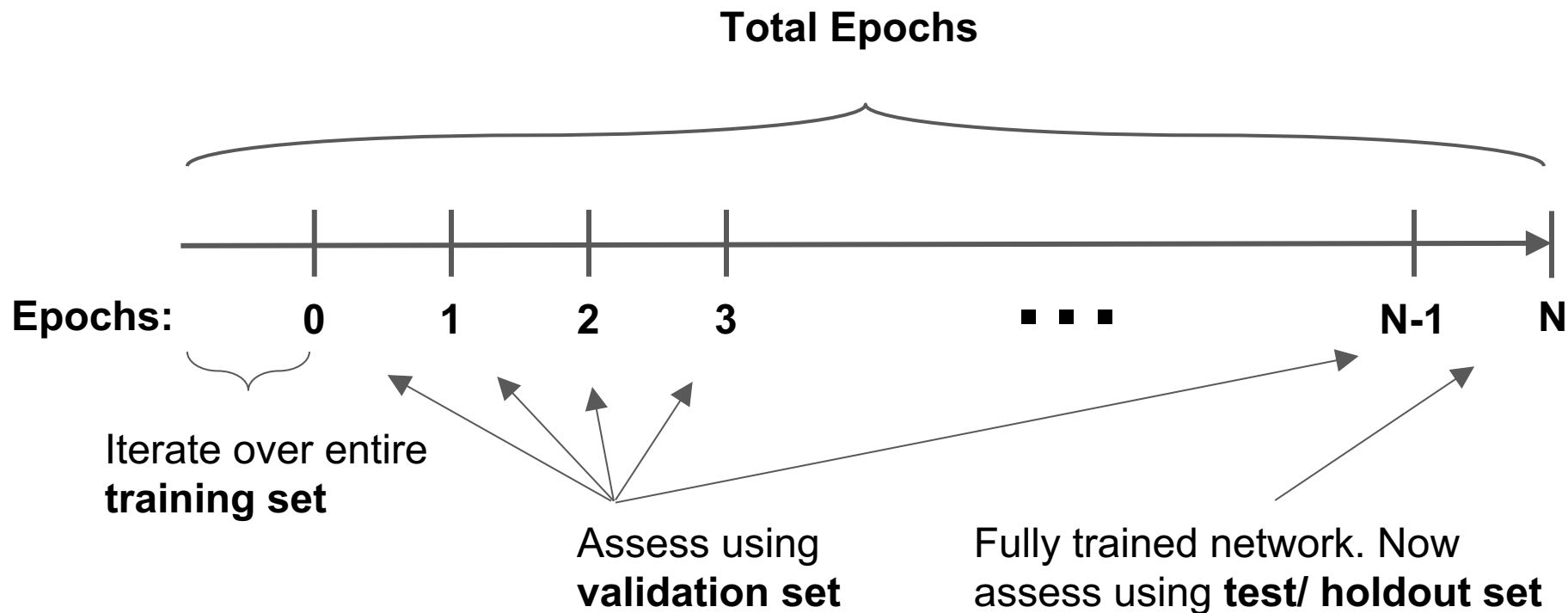
Split - percentages depend on available data



Balance - data distributed close to uniformly



Training, Validation, and Testing



References & Further Reading

- [1] Russell, Stuart, Peter Norvig, and Artificial Intelligence. "A modern approach." Artificial Intelligence. Prentice-Hall, Englewood Cliffs 25 (1995): 27.
- [2] McCulloch, Warren S., and Walter Pitts. "A logical calculus of the ideas immanent in nervous activity." The bulletin of mathematical biophysics 5.4 (1943): 115-133.
- [3] Ivakhnenko, Alekseï Grigor'evich, and Valentin Grigorévich Lapa. Cybernetic predicting devices. No. TR-EE66-5. PURDUE UNIV LAFAYETTE IND SCHOOL OF ELECTRICAL ENGINEERING, 1966.
- [4] LeCun, Yann, et al. "Gradient-based learning applied to document recognition." Proceedings of the IEEE 86.11 (1998): 2278-2324.
- [5] Krizhevsky, Alex, Ilya Sutskever, and Geoffrey E. Hinton. "Imagenet classification with deep convolutional neural networks." Advances in neural information processing systems. 2012.
- [6] Generative Adversarial Nets
- [7] Neural Turing Machines
- [8] Mastering the game of Go with deep neural networks and tree search
- [9] Halevy, Alon, Peter Norvig, and Fernando Pereira. "The unreasonable effectiveness of data." IEEE Intelligent Systems 24.2 (2009): 8-12.

Upcoming Events

- MIT MIC reading group: Paper: [Fully Convolutional Networks for Semantic Segmentation](#)
Location: MIT 32-144 (building 32, room 144)
Date: 9.14.17 Time: 5 PM
- BU MIC reading group: Paper: [Neuroevolution of Augmenting Topologies](#)
Location: BU Hariri Seminar Room
Date: 9.15.17 Time: 7 PM
- Next workshop: Topic: Gradient-Based Learning
Location: BU Hariri Seminar Room
Date/Time: 9.19.17 @ 7 PM

Join us online for more!



Facebook group: <https://goo.gl/tDaeQk>

Facebook page: <https://goo.gl/ib6y4s>



Google Calendar: <https://goo.gl/KHRCxw>



Mailing List: <http://eepurl.com/c2lXqn>