



Machine Learning

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https://github.com/safayani/machine_learning_course



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Machine Learning

- Grew out of work in AI
- New capability for computers
- Learn from Data

Examples

CATs vs DOGs

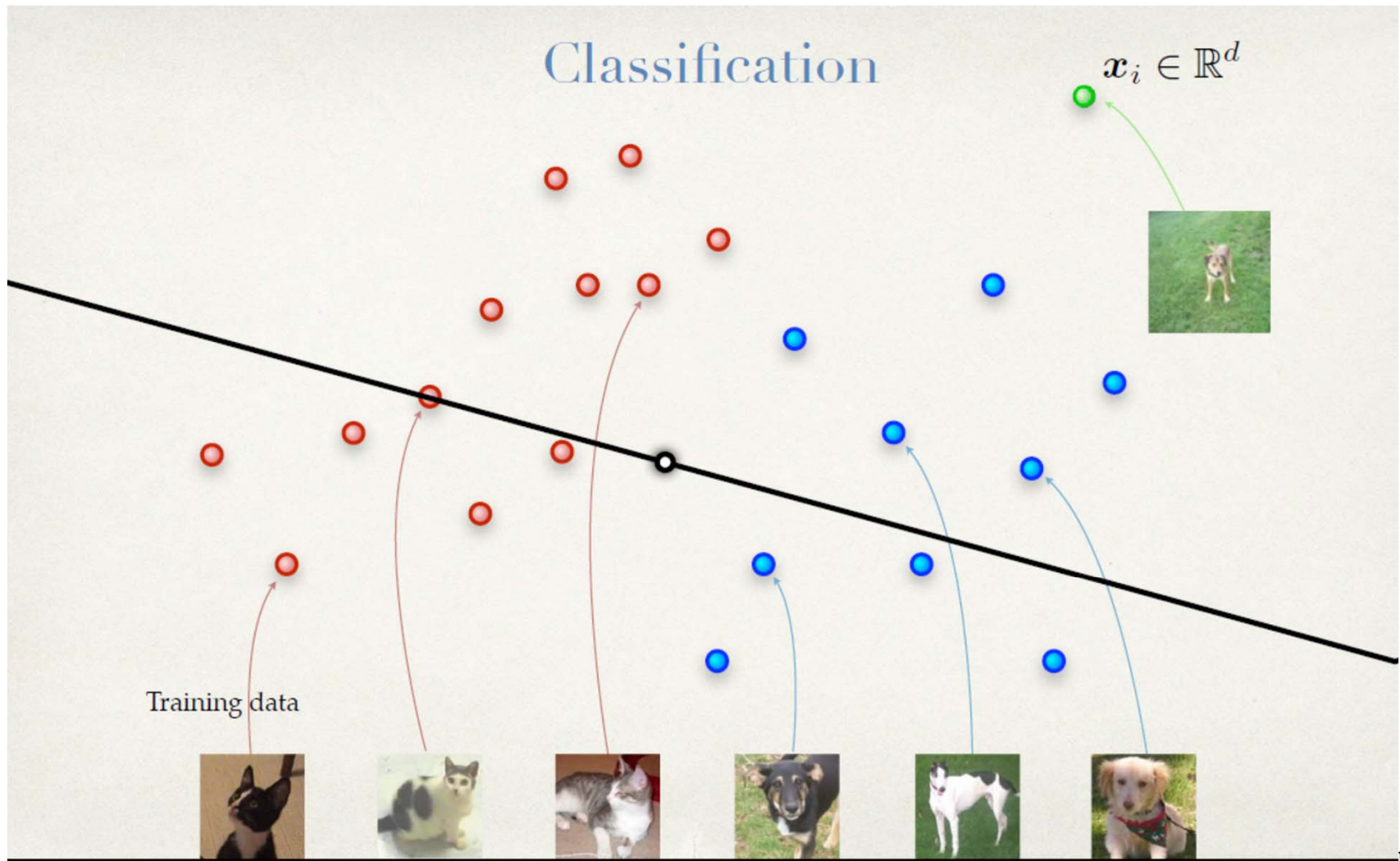


if-then-else

\neq

intelligence

Classification



It is very hard to say what makes a 2

0 0 0 1 1 1 1 1 1 2

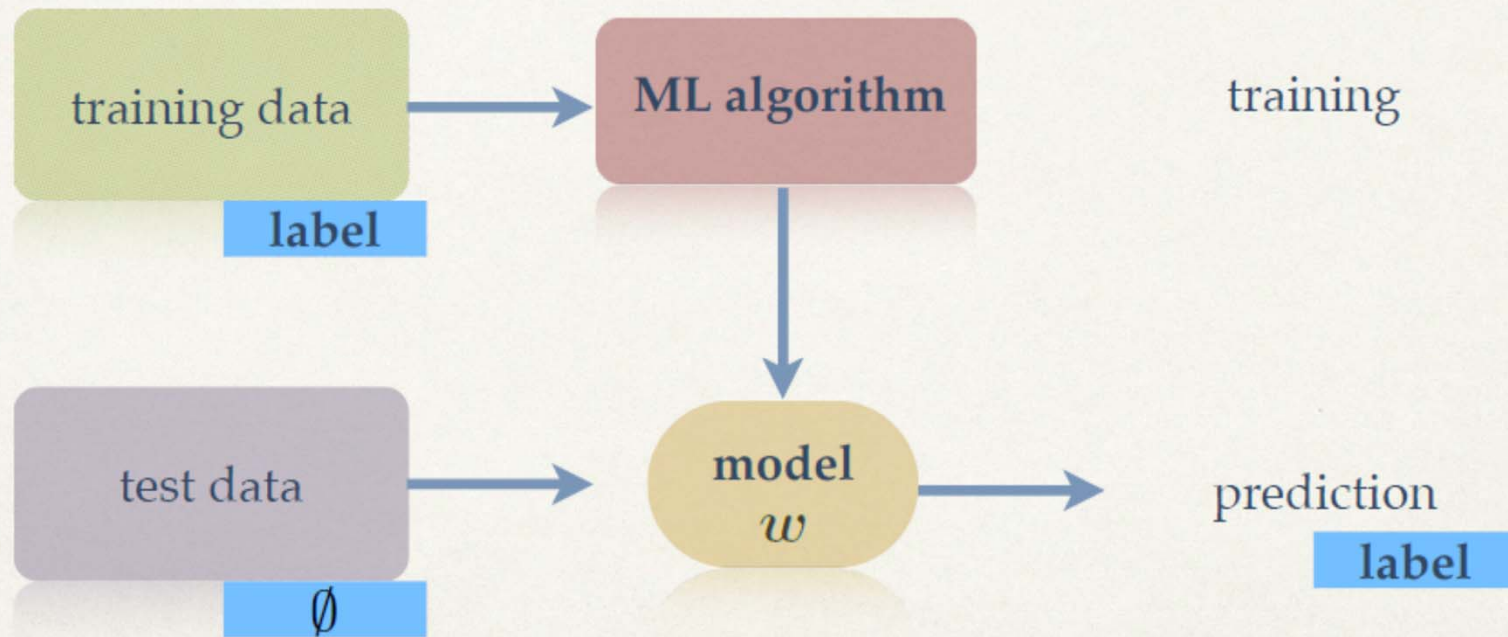
2 2 2 2 2 2 2 3 2 3

3 4 4 4 4 4 5 5 5 5

6 6 7 7 7 7 7 8 8 8

9 9 9 9 9 9 9 9 9

Machine Learning Fundamentals

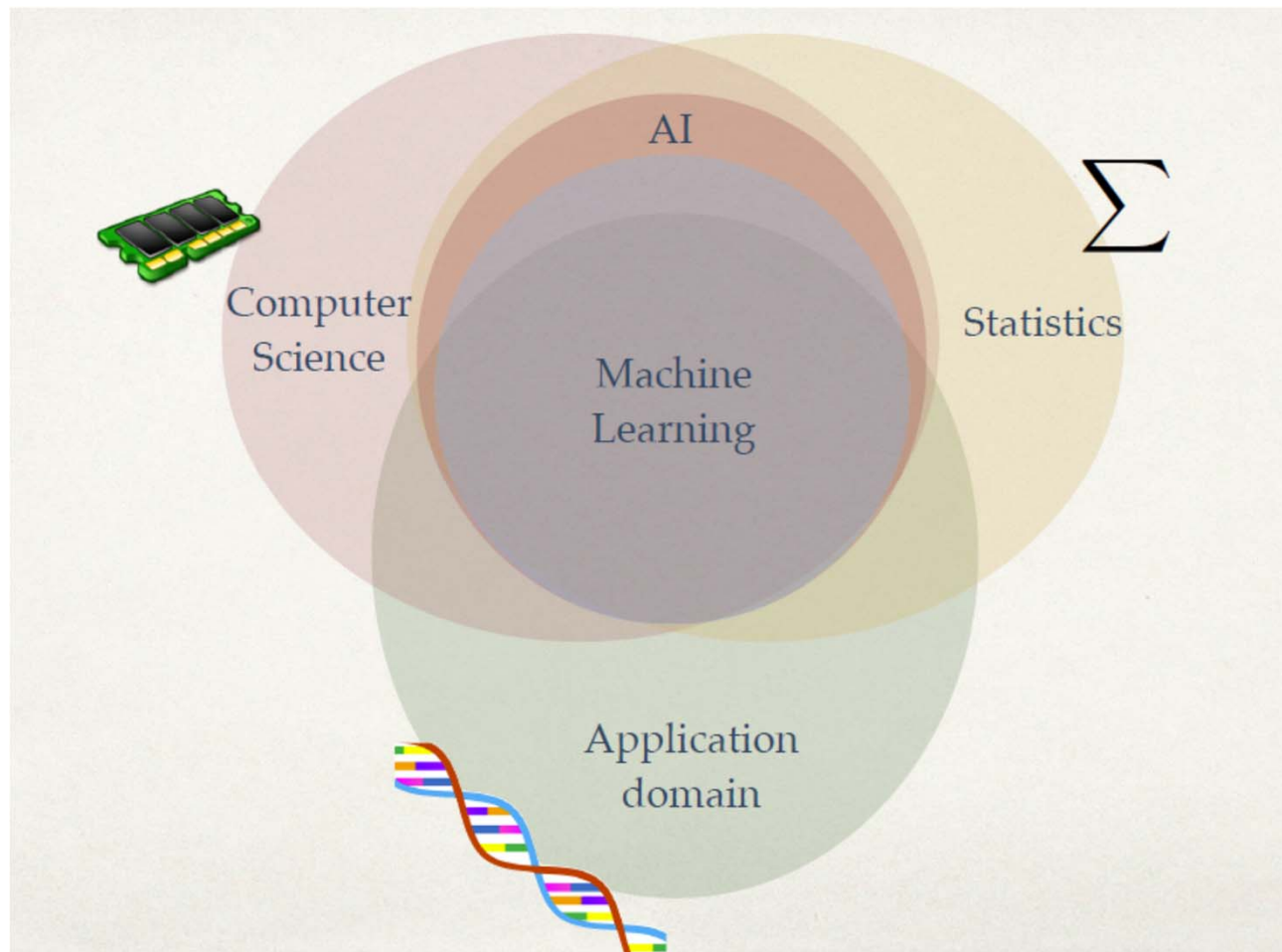


Machine Learning definition

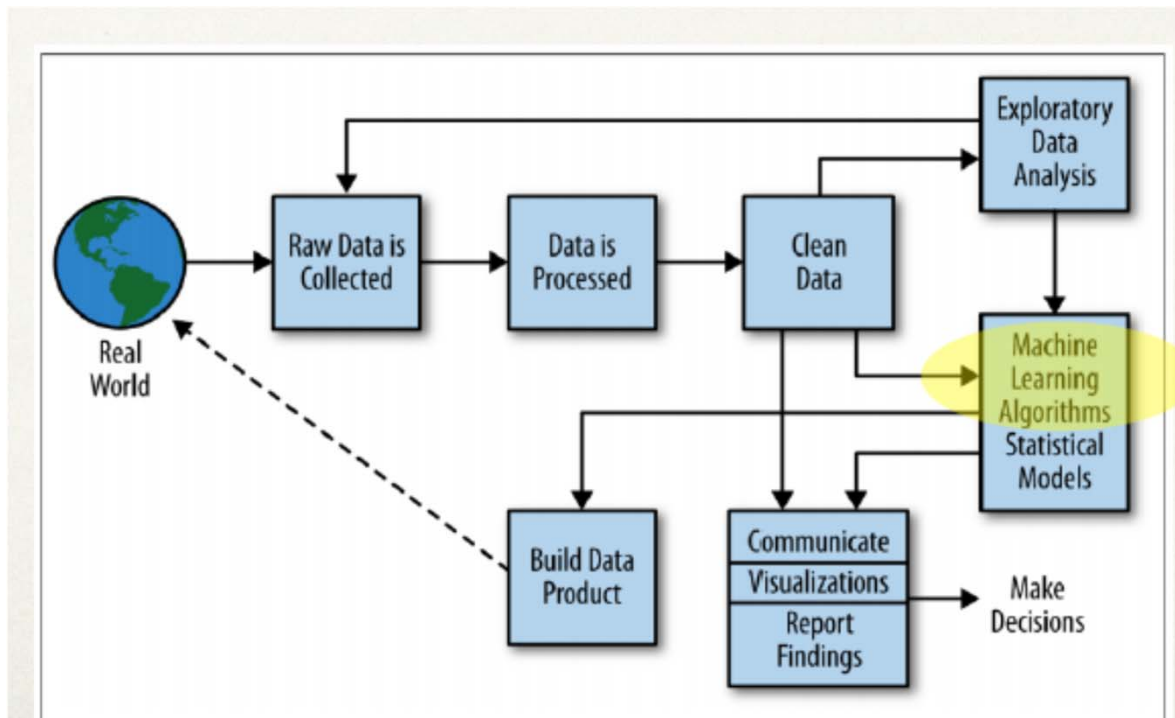
- Arthur Samuel (1959). Machine Learning: Field of study that gives computers the ability to learn without being explicitly programmed.
- Tom Mitchell (1998) Well-posed Learning Problem: A computer program is said to *learn* from experience E with respect to some task T and some performance measure P , if its performance on T , as measured by P , improves with experience E .

“A computer program is said to *learn* from experience E with respect to some task T and some performance measure P, if its performance on T, as measured by P, improves with experience E.”

Suppose your email program watches which emails you do or do not mark as spam, and based on that learns how to better filter spam. What is the task T in this setting?



ML is only a small part!



More Examples:

- Database mining

Large datasets from growth of automation/web.

E.g., Web click data, medical records, biology, engineering

- Applications can't program by hand.

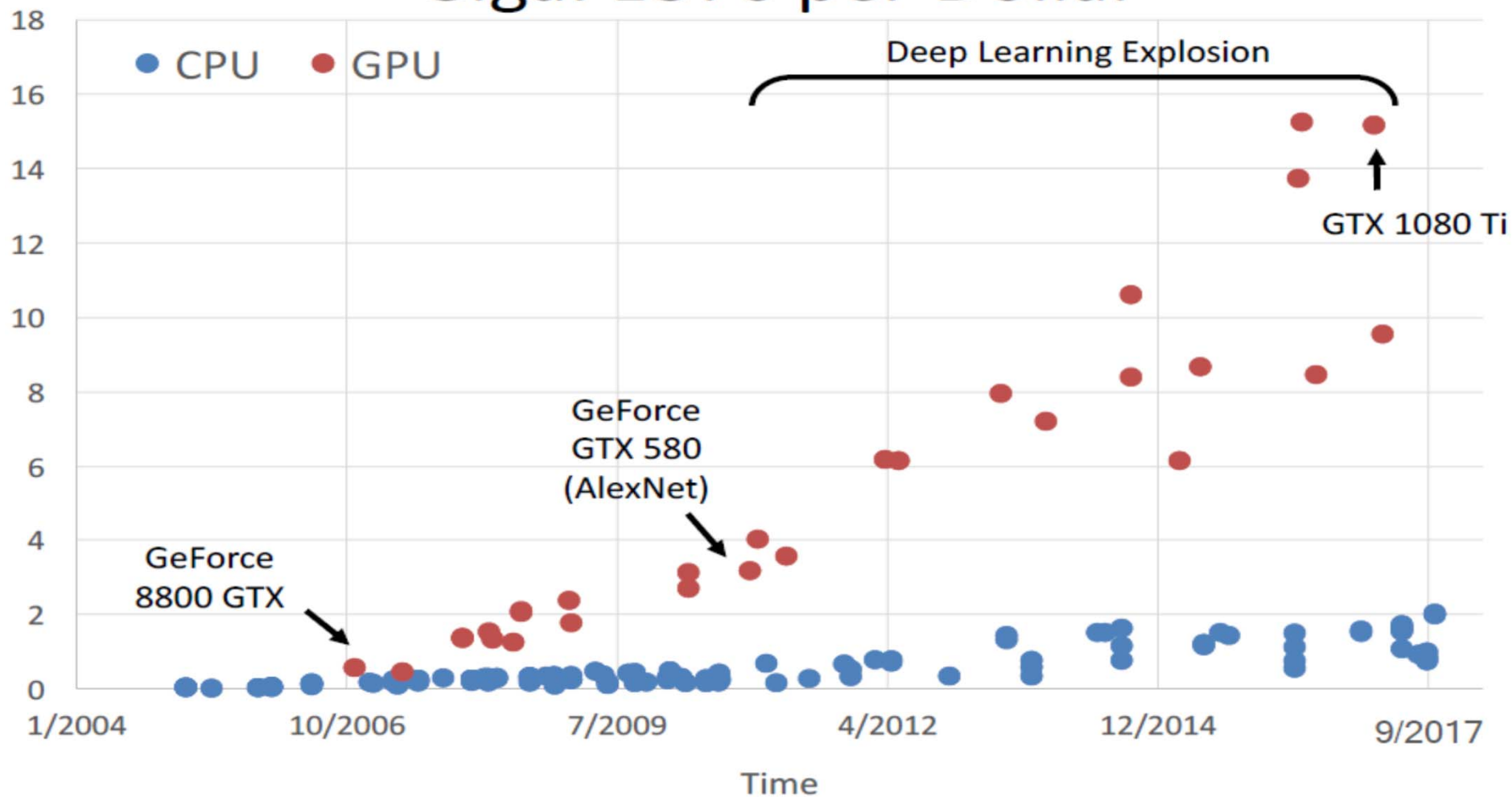
E.g., Autonomous helicopter, handwriting recognition, most of Natural Language Processing (NLP), Computer Vision.

- Self-customizing programs

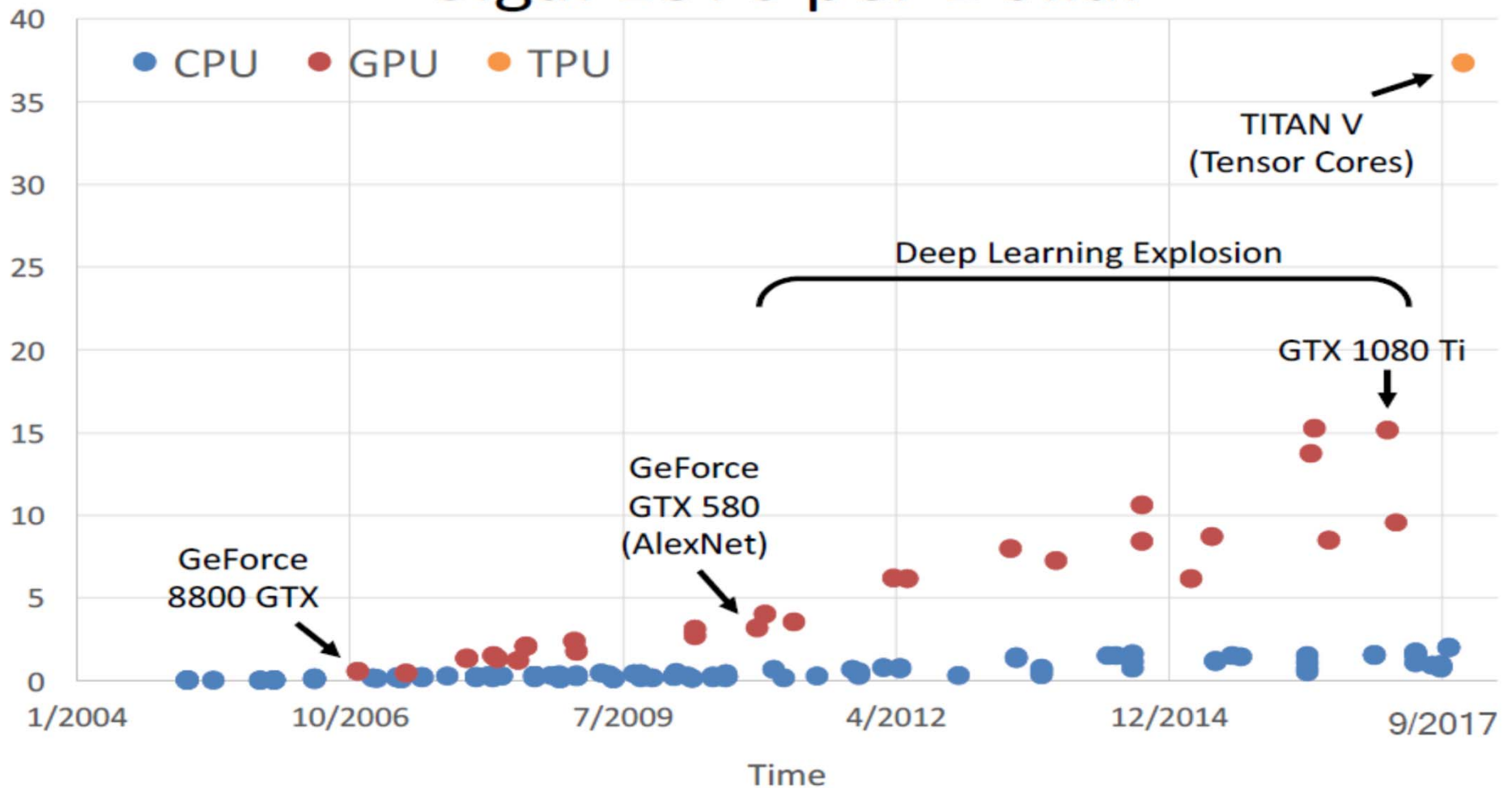
E.g., Amazon, Netflix product recommendations

- Understanding human learning (brain, real AI).

GigaFLOPs per Dollar



GigaFLOPs per Dollar



What to expect?

- overview over ML
- basic understanding of most important ML methods and fundamental concepts
- experience how ML is done on a practical problem

What not to expect?

- instantly becoming an **expert** data scientist / ML researcher / statistician / large-scale ML specialist / ML software expert / domain expert
- You will not learn ALL advanced methods.
- This course is not specially about big data or large-scale methods.

Syllabus

- Introduction
- Regression
 - Least Square
 - Maximum Likelihood
 - Overfitting
 - Regularization
 - Ridge and Lasso Regression
 - Model Selection
 - Bias and variance

Syllabus

- Classification
 - Logistic Regression
 - softmax regression
 - Bayes classifier
 - Naive Bayes
 - K-nearest Neighbors
 - support vector machine
 - Decision tree
 - Error metrics for unbalance data
- Unsupervised Learning
 - k-means clustering
 - Gaussian mixture models
 - Expectation maximization
 - Dimension Reduction
 - Singular value decomposition
 - Principal Component Analysis

Prerequisites

- Statistics and probability
- Linear Algebra
- Programming

Recommended Textbooks

- G. James, D. Witten, T. Hastie and R. Tibshirani: An introduction to statistical learning
- C. Bishop: Pattern Recognition and Machine Learning
- K. Murphy: Machine Learning: A Probabilistic Perspective

Related Courses

- Machine Learning, EPFL,
<https://www.epfl.ch/labs/mlo/machine-learning-cs-433/>
- Machine Learning, Stanford university, Coursera
<https://www.coursera.org/learn/machine-learning>

Teacher Assistants


- Fatemeh Piri
- Ali Tamizifar
- Arsham haghghat
- Amir Arbab

Course Strategy

- Assignments and projects 20% to 30%
- Midterm and quizzes 30% to 40%
- Final 30% to 40%



برای دریافت آموزش های بیشتر در حوزه یادگیری عمیق و یادگیری ماشین کانال زیر را دنبال کنید:



Mehran Safayani
هوش مصنوعی برای همه
Machine Learning • Deep Learning • Soft Computing

۶۰۷ هزار
بار دیده شد

۷۲
دنبال کننده

هوش مصنوعی برای همه تنظیمات

هوش مصنوعی
مدرس: دکتر مهرون صفایانی

خانه

همه ویدیوها

لیست پخش

درباره کانال

پایاس و واریانس
ج ۱۰
Machine Learning
یادگیری ماشین جلسه دهم- پایاس و واریانس (Machine Learning)
۳۵ بازدید - ۴۰ ماه پیش

اعتبارسنجی متقابل
ج ۱۱
Machine Learning
یادگیری ماشین جلسه یازدهم- اعتبارسنجی متقابل (Machine Learning)
۳۹ بازدید - ۴۰ ماه پیش

تخمین MAP
ج ۱۲
Machine Learning
یادگیری ماشین جلسه دوازدهم MAP estimation
۷۵ بازدید - ۴۰ ماه پیش

Naive Bayes
ج ۱۳
Machine Learning
یادگیری ماشین جلسه سیزدهم- Naive Bayes
۸۶ بازدید - ۴۰ ماه پیش

Logistic Regression
ج ۱۴
Machine Learning
یادگیری ماشین جلسه چهاردهم Logistic Regression
۸۶ بازدید - ۴۰ ماه پیش

روش نیوتن
ج ۱۵
Machine Learning
یادگیری ماشین جلسه پانزدهم Newton method
۸۰ بازدید - ۴۰ ماه پیش

نزول گرادیان
ج ۴
Machine Learning
یادگیری ماشین جلسه چهارم- نزول گرادیان (Machine Learning)
۵۸ بازدید - ۴۰ ماه پیش

نزول گرادیان
ج ۵
Machine Learning
یادگیری ماشین جلسه پنجم- نزول گرادیان (Machine Learning)
۵۷ بازدید - ۴۰ ماه پیش

Least Square
ج ۶
Machine Learning
یادگیری ماشین جلسه ششم- کمترین مربع - Least Square
۴۴ بازدید - ۴۰ ماه پیش

mini-batch gradient descent
ج ۷
Machine Learning
یادگیری ماشین جلسه هفتم - mini-batch gradient descent
۳۹ بازدید - ۴۰ ماه پیش

Maximum Likelihood
ج ۸
Machine Learning
یادگیری ماشین جلسه هشتم- Maximum Likelihood
۵۰ بازدید - ۴۰ ماه پیش

بیش برازش
ج ۹
Machine Learning
یادگیری ماشین نهم Overfitting
۳۷ بازدید - ۴۰ ماه پیش

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Andrew Ng