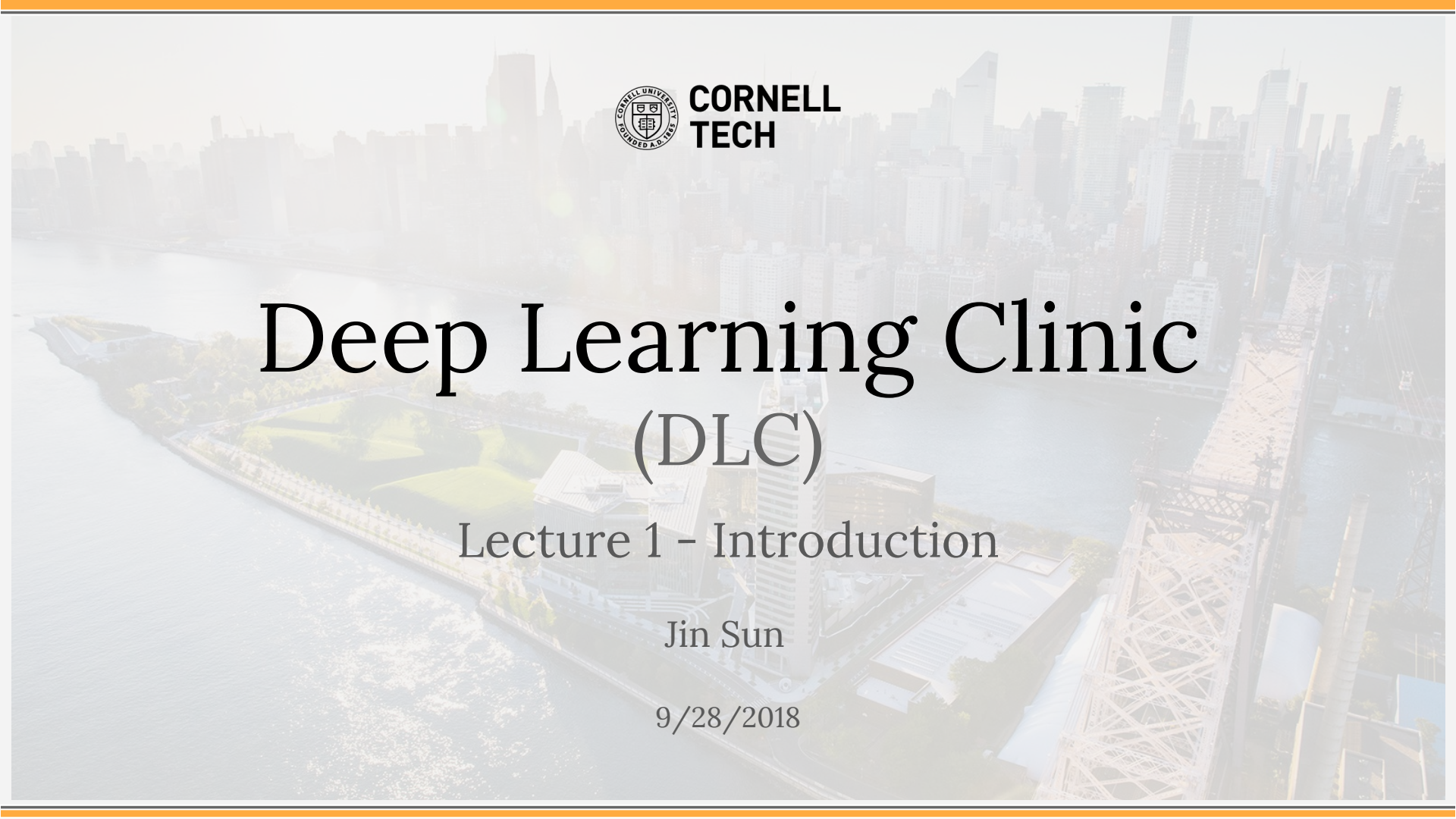


CORNELL TECH

Deep Learning Clinic (DLC)

Lecture 1 - Introduction

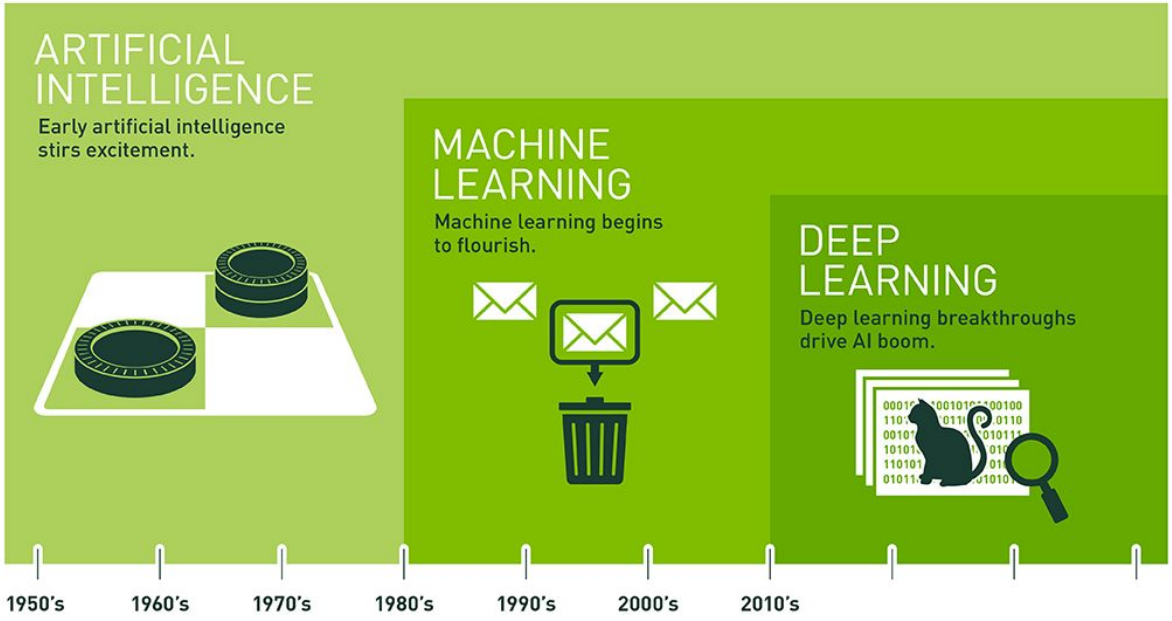
Jin Sun

9/28/2018

Welcome

- **Overview of the class**
  - Background
  - Logistics
- Lectures preview
- Lab preview
- FAQ
- A simple interactive machine learning example

Overview of DLC - Background



Since an early flush of optimism in the 1950s, smaller subsets of artificial intelligence – first machine learning, then deep learning, a subset of machine learning – have created ever larger disruptions.

Overview of DLC - Background

Overview of DLC - Background

Overview of DLC - Background

What DL is good for

Problems with massive data

Classification problems

Regression problems

Correlation relationship

What DL is not good at

Limited amount data

Partial labels

Structure output

Long term relationship

Causal relationship

Overview of DLC

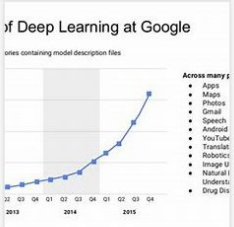
deep learning tutorial

Deep Learning Tutorial **PDF**

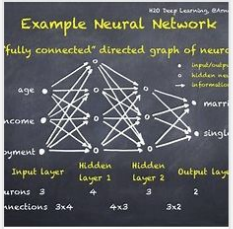
Open Source Deep Learning Tutorial

Deep Learning **Examples**

Deep Learning **Explained**

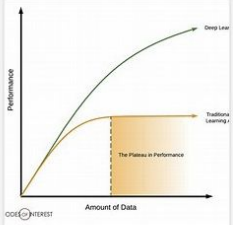


Deep Learning Google

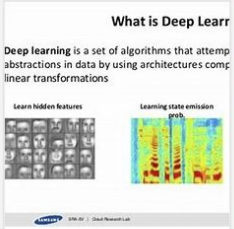


Deep Learning Example

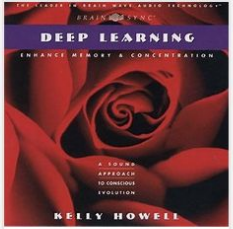
Deep Learning Tools



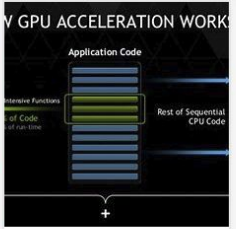
Deep Learning Plateau



Deep Learning Algorithms

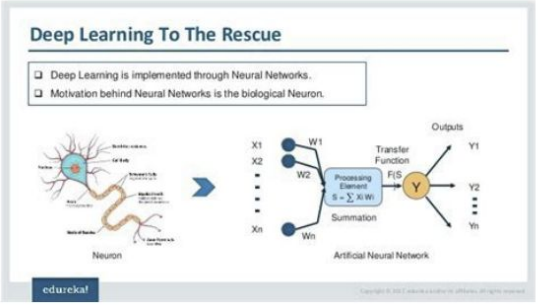


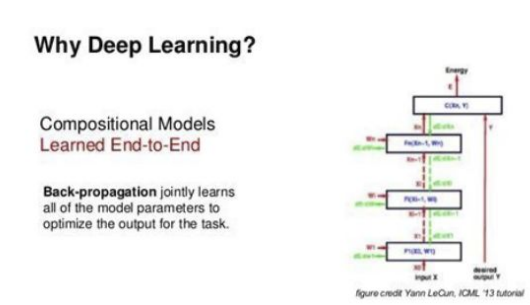
Deep Learning Kelly Howell



Deep Learning GPU

Deep Processing a





DL/ML Basic Concepts

Real World Application

Hands On

Step-by-step

Deep Learning Clinic

Practical Guidance

One-on-one

Get Started

For You

Technical Background

What tools to use

How to use existing tools

Eager to solve complex real world problems

How to train a DL model

Overview of DLC - Logistics

Lecture Session

Fri 8:30-10am, Bloomberg 081

- Introduction to:
  - Techniques
  - Tools
  - Tricks
  - How to solve a real-world problem
- Concise

Lab Session

Wed 8:30-9:30am, Bloomberg 061

- One-on-one advice
- Problem solving:
  - Feasibility evaluation
  - Modeling and task formulation
  - Network design
  - Practical guidance on training

Zero-credit, no assignments or evaluations.

Overview of DLC - Reference

Online Courses

MIT 6.S191: Introduction to Deep Learning link

Stanford CS231n: Convolutional Neural Networks for Visual Recognition link

Free Textbooks

A Course in Machine Learning by Hal Daume III link

Deep Learning by Ian Goodfellow and Yoshua Bengio and Aaron Courville link

Overview of DLC - Logistics

Jin Sun

jinsun@cornell.edu - *Please include the tag ‘DLC’ in the subject

http://www.cs.cornell.edu/~jinsun/

Slack channel: https://dlc18.slack.com/, open to cornell.edu address

Survey: https://www.surveymonkey.com/r/NVV8V59

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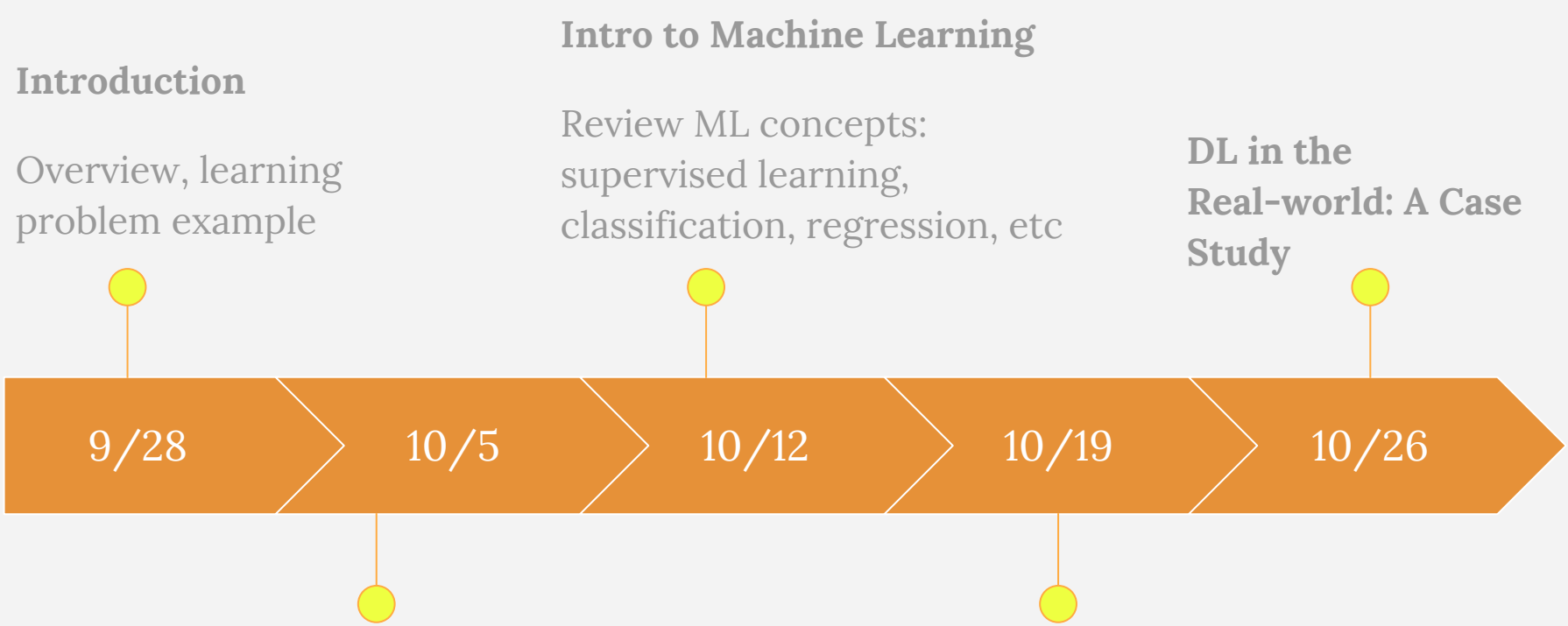
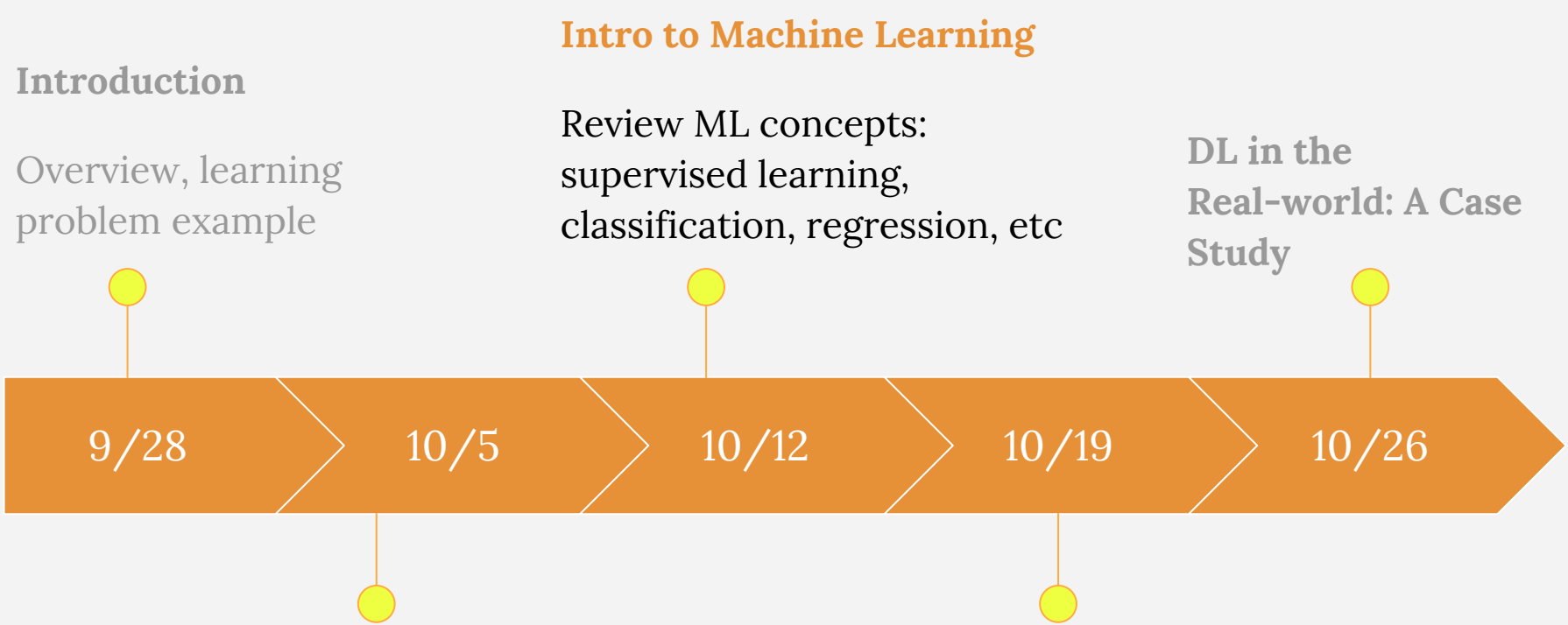

Introduction
Overview, learning problem example
Intro to Machine Learning
Review ML concepts: supervised learning, classification, regression, etc
DL in the Real-world: A Case Study
9/28
10/5
10/12
10/19
10/26
Deep Learning Frameworks
Setup DL env, Pytorch, TensorFlow
Intro to Deep Learning
Optimization, network structures

10/5 Deep Learning Frameworks

How to set up a basic deep learning development environment

Python virtualenv, Jupyter Notebook

By the end of this lecture, you should have a working DL environment to play with!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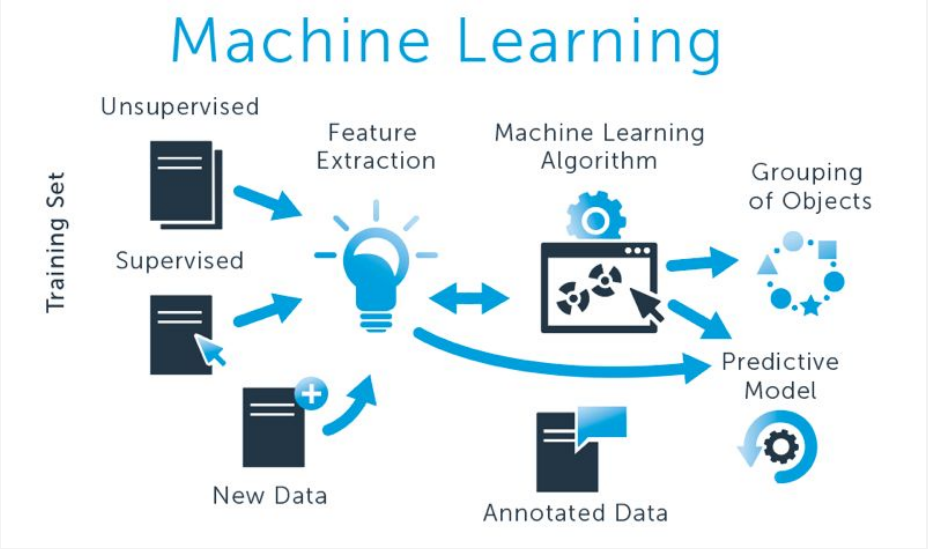
10/12 Brief Introduction to Machine Learning

Introduction/Review of core ML concepts:

- Supervised learning
- Unsupervised learning
- Classification
- Regression
- Training
- Evaluation, Cross-validation, and etc



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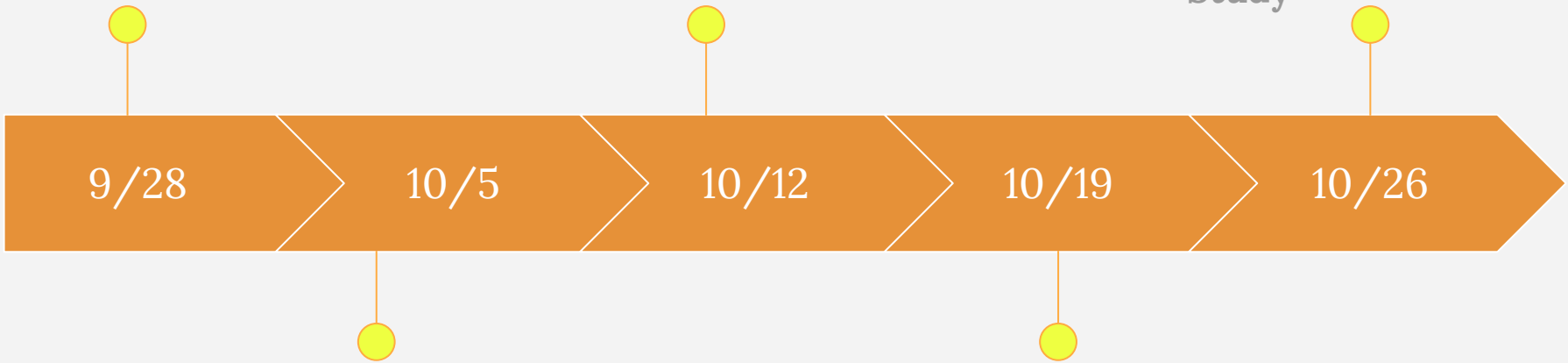

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Optimization, network structures

10/19 Brief Introduction to Deep Learning

Introduction/Review of DL topics:

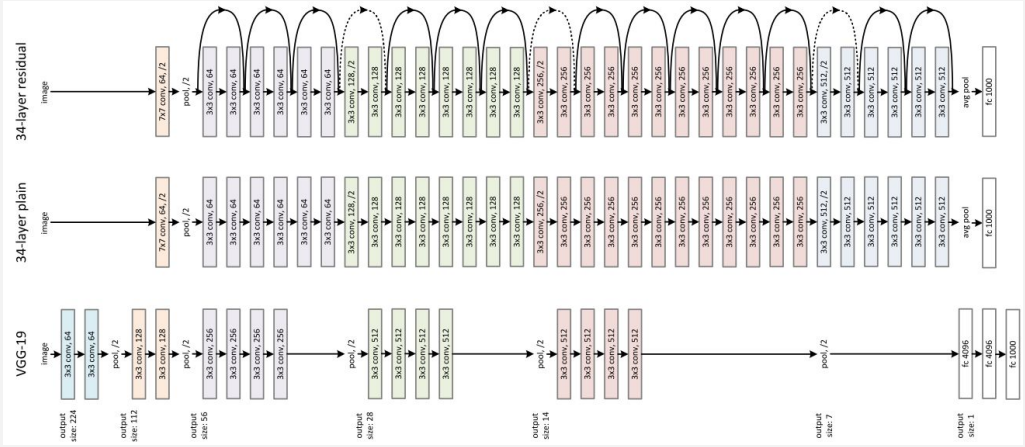
Optimization techniques

Network structures (e.g., Fully Connected Nets, Convolutional Nets, Recurrent Nets)

Generative Adversarial Nets

Reinforcement Learning

...



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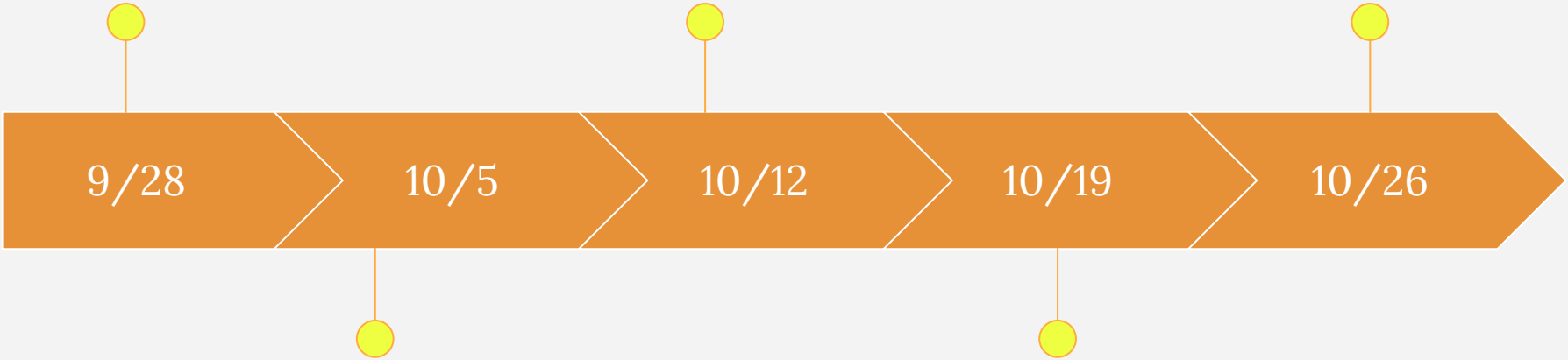

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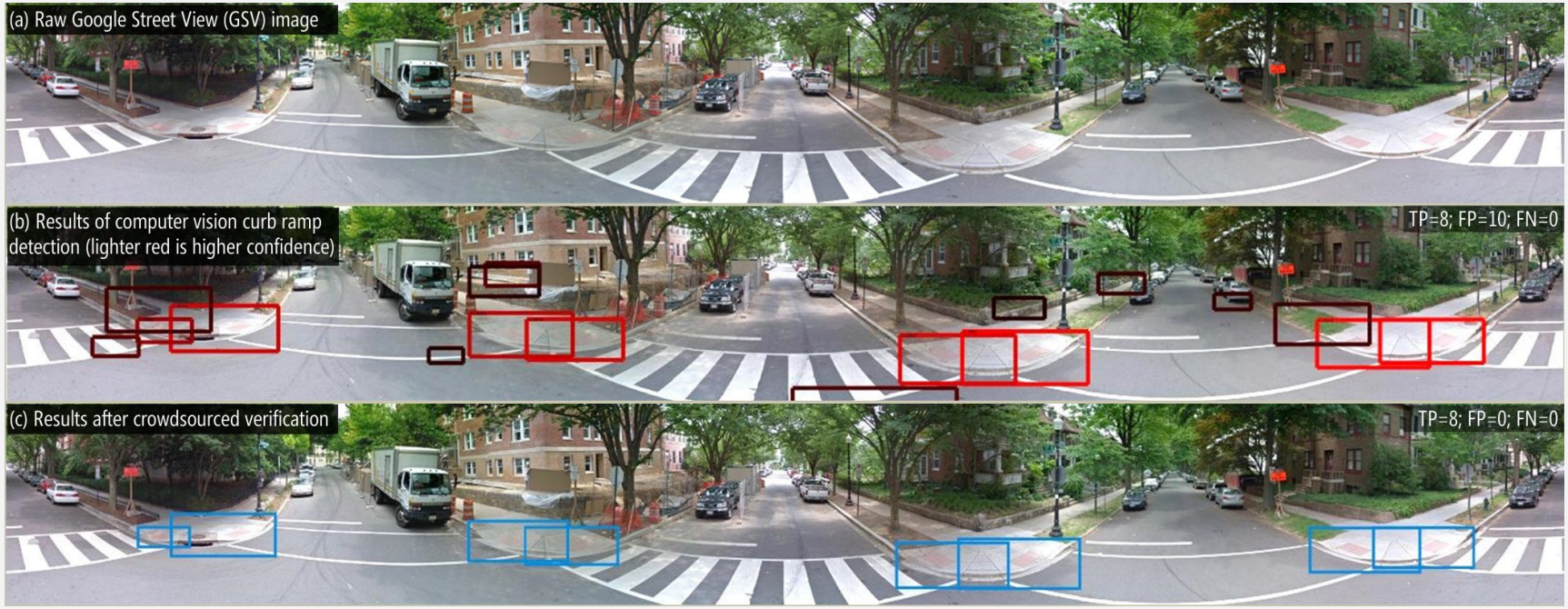
10/26 DL in the Real-World: A Case Study



Problem Formulation → Data Collection → Model Training → Evaluation

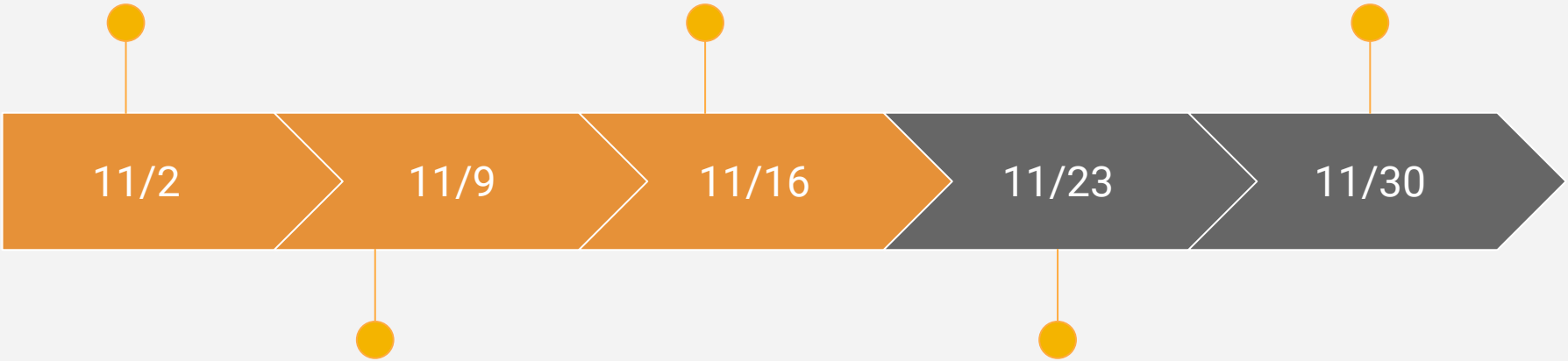
Data

Data collection, labeling, verification, MTurk

Real-World Ready Tools

Google Cloud Vision, AutoML, Face++, Detectron, NLTK, etc

Office Hours



Tricks on Training NN

Practical tips: pre-processing, learning rate, batch size, etc

Thanksgiving

Data

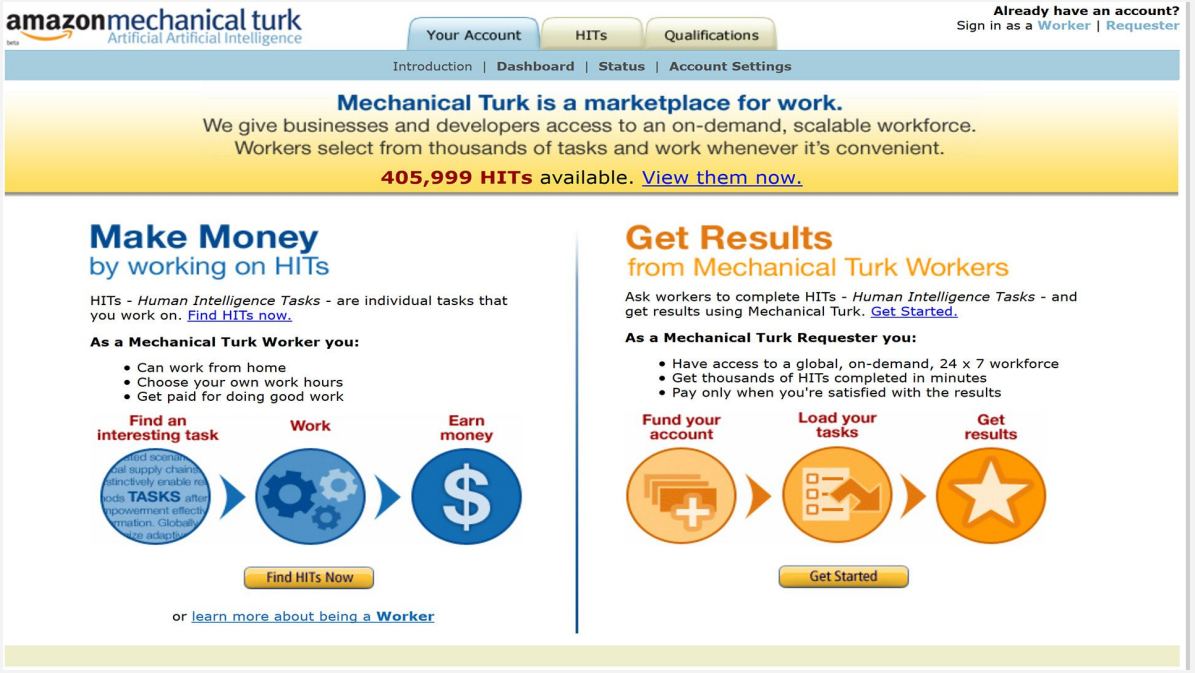
Data Collection

Data Annotation

Verification

How to use

Amazon Mechanical Turks



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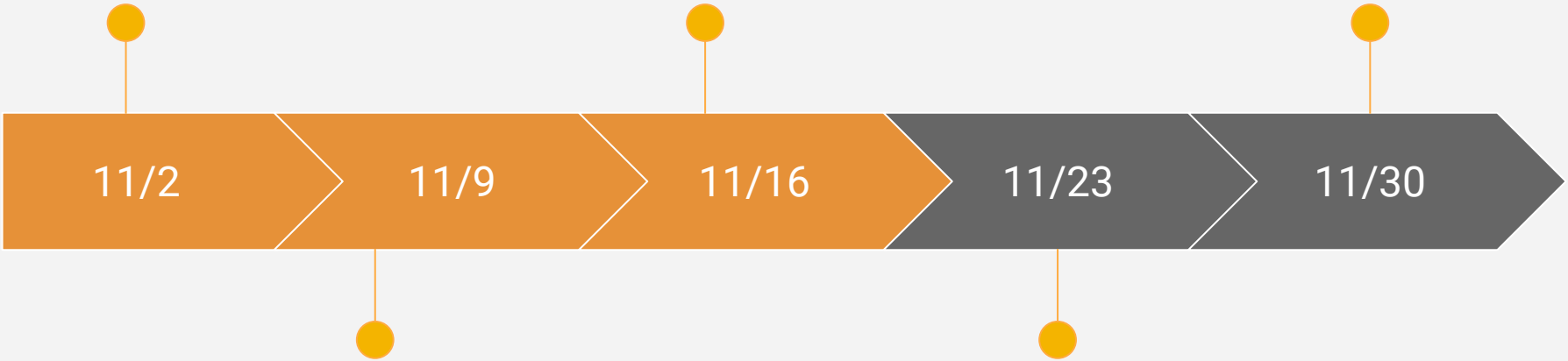


Tricks on Training NN

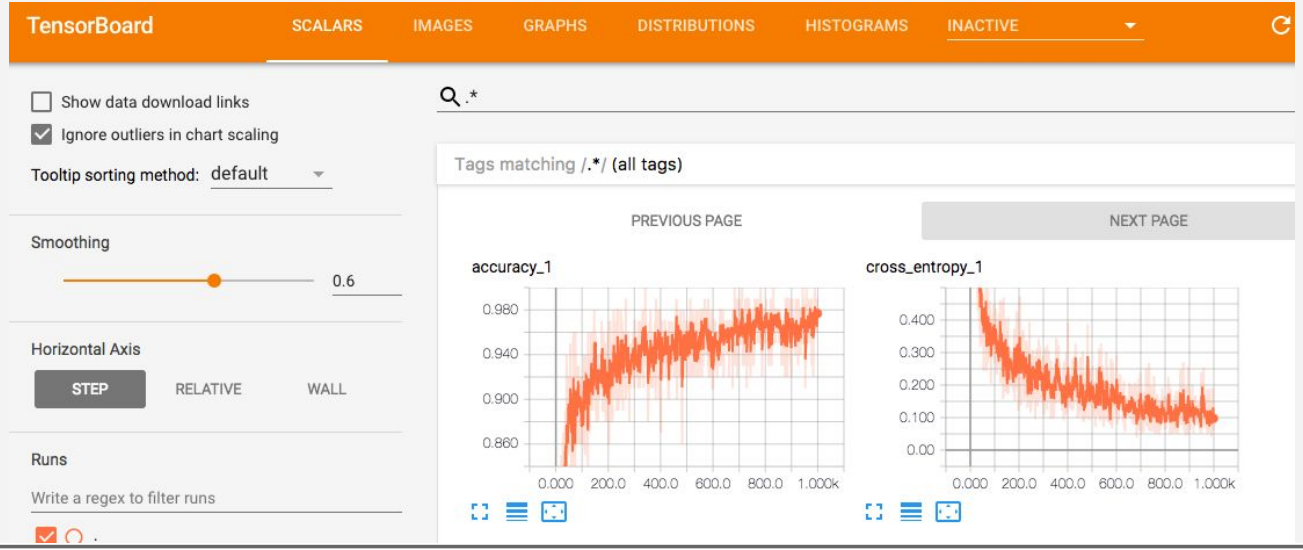
Practical tips: pre-processing, learning rate, batch size, etc

Thanksgiving

11/9 Tricks on Training Neural Networks

Practical tips and tricks

Pre-processing, post-processing, learning rate, batch size, normalization, network depth, architecture search, fine-tuning, and etc



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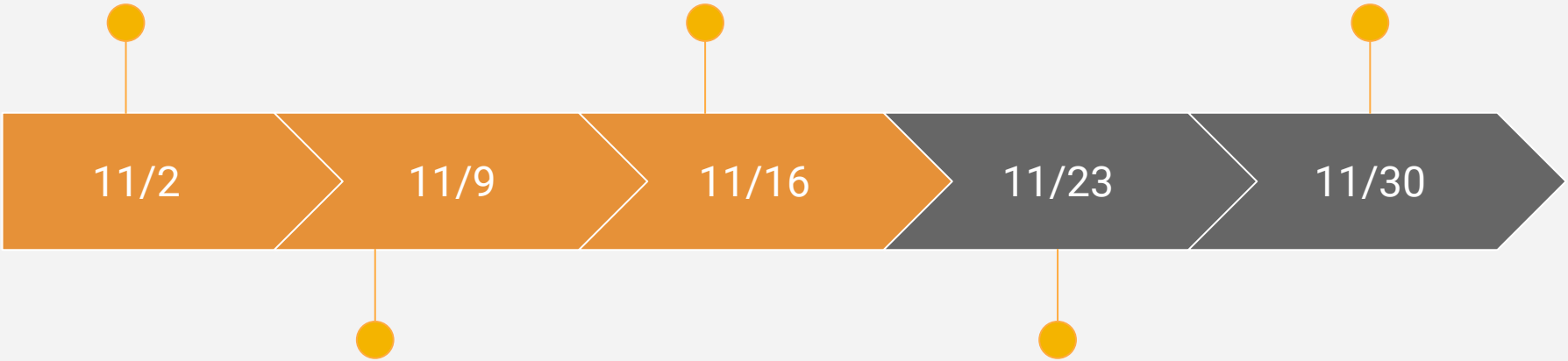


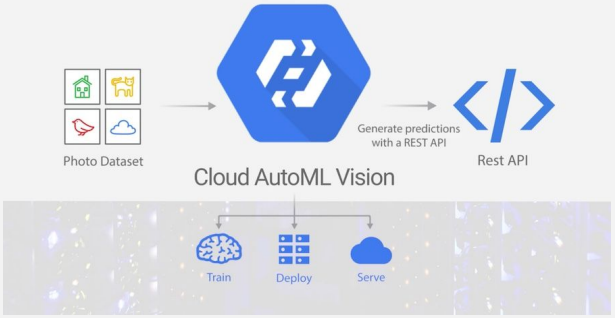
Tricks on Training NN

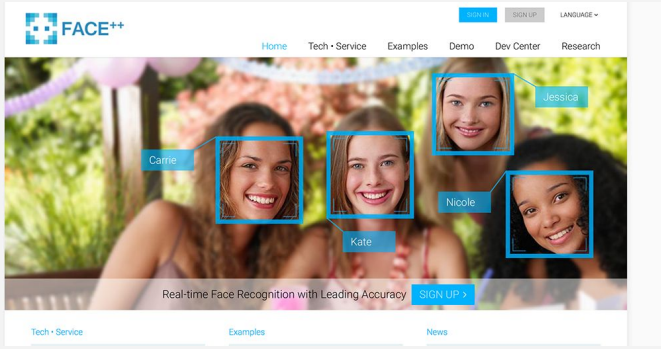
Practical tips: pre-processing, learning rate, batch size, etc

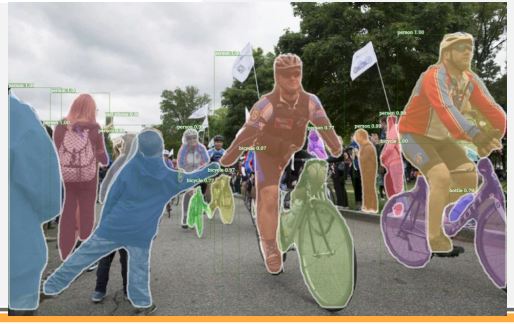
Thanksgiving

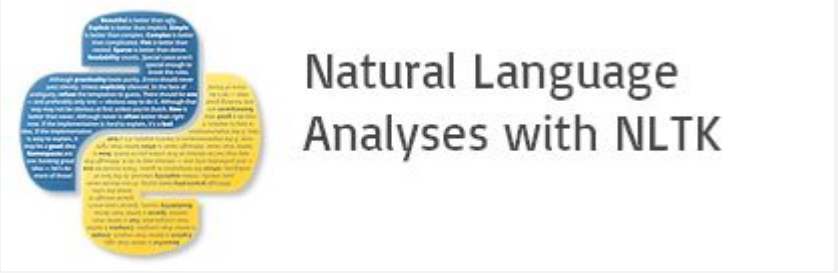
Real-World Ready Machine Learning Tools

Tools that are widely used and proven to be effective in real-world problems









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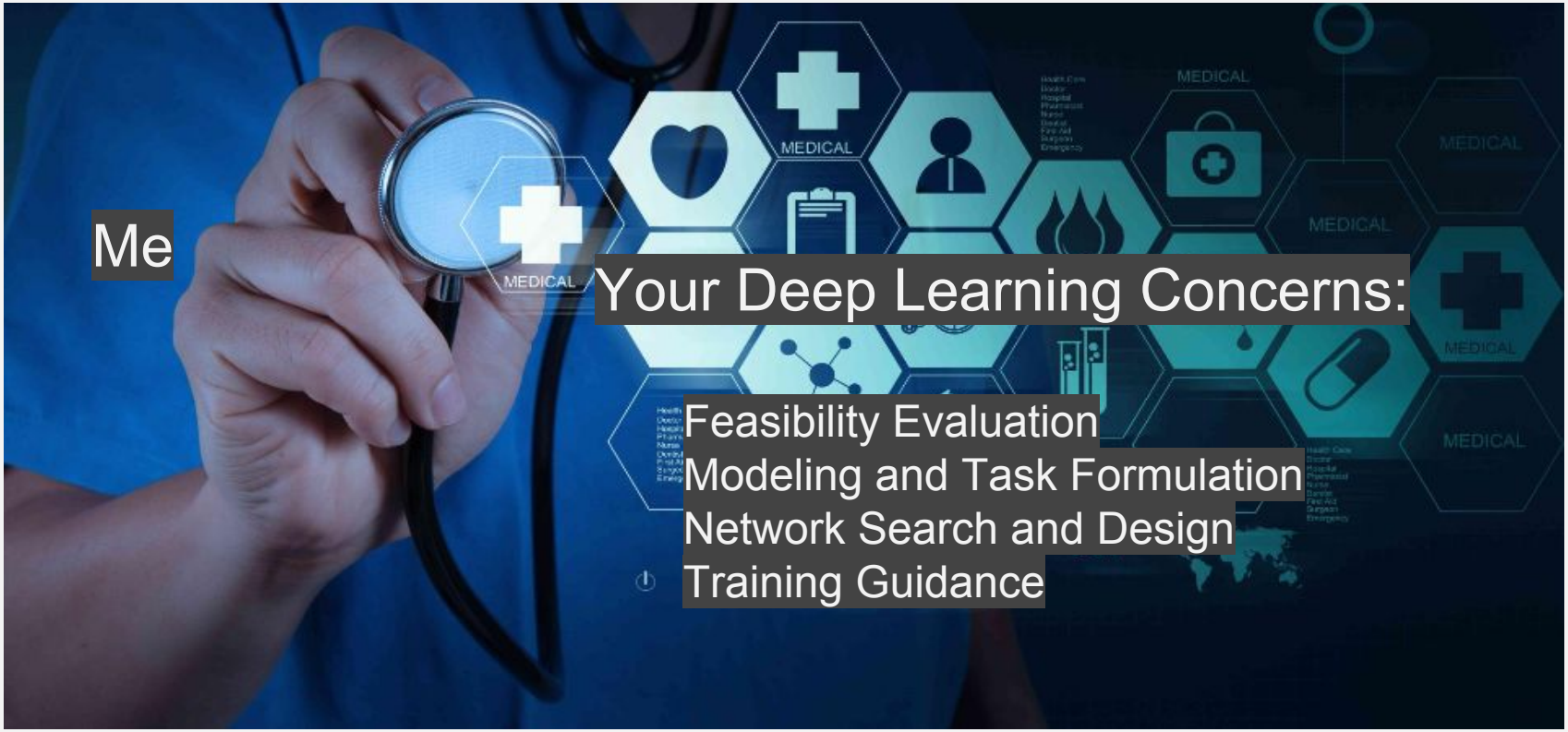
- Lectures preview
- **Lab preview**
- FAQ
- A simple interactive machine learning example

Lab Preview


Me
Your Deep Learning Concerns:
Feasibility Evaluation
Modeling and Task Formulation
Network Search and Design
Training Guidance

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- A simple interactive machine learning example

FAQ

Can I attend only selected sessions?

Sure! But I recommend to you to attend the first few introduction lectures to grasp some basic understanding about DL/ML.

I don't have a strong technical background, can I still attend?

Of course! Come for the lectures that provide high level idea and how to use existing tools for quick prototyping. (9/28, 10/5, 10/26, 11/2, 11/16)

Do I have to come for every lab session?

Only come as you needed, or when there's a guided exercise (later this semester) that you are interested.

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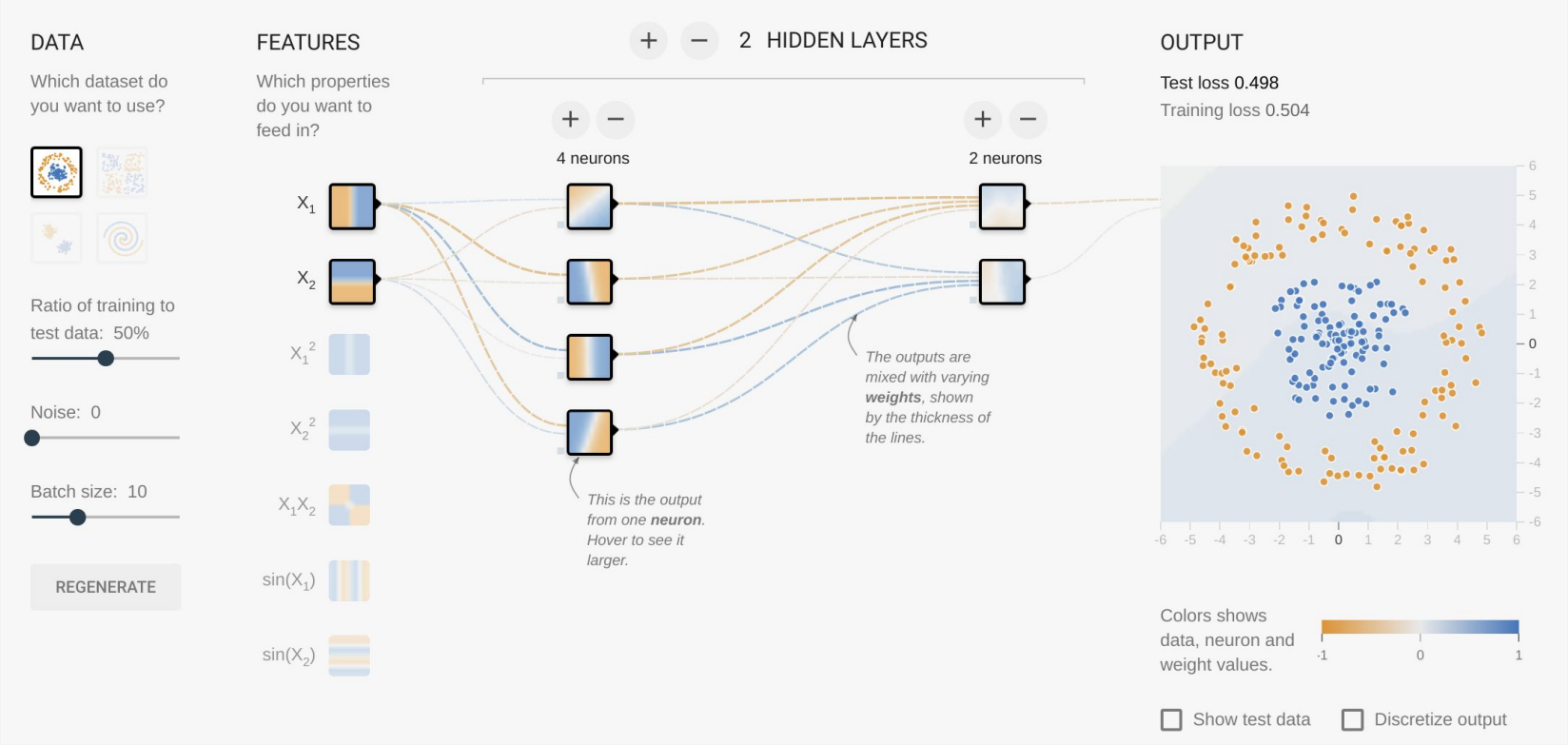
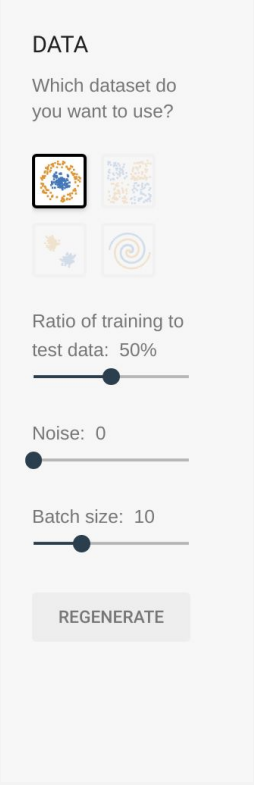
- **A simple interactive machine learning example**

A Simple Interactive Machine Learning Example



A Neural Network Playground [Link]



Data:

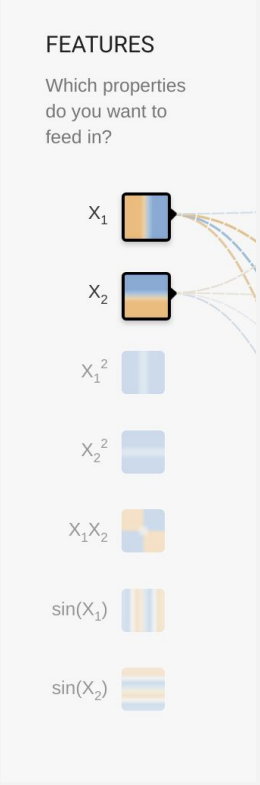
(x,y) 2D Points

Binary Label

Train/Test Split

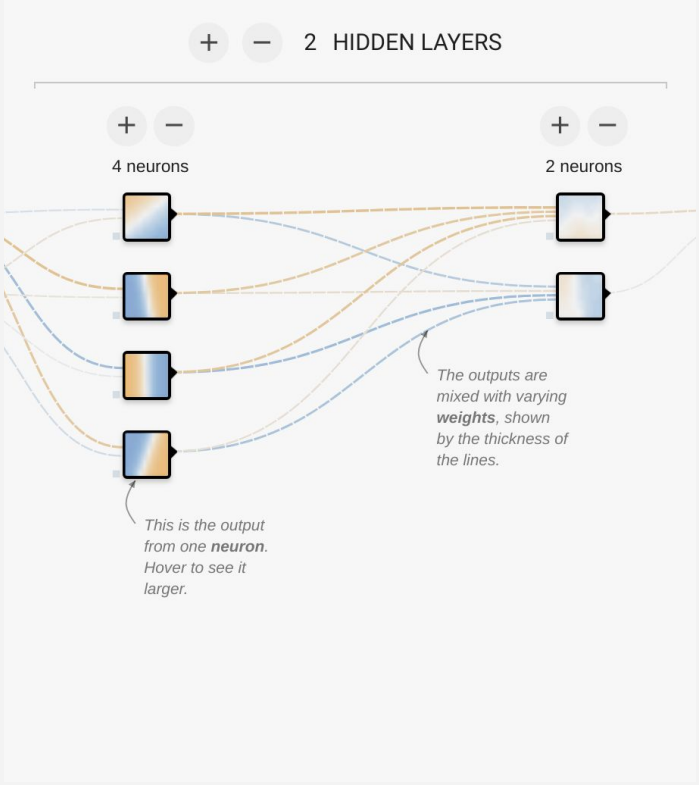
Noise Level

Batch Size



Feature Representation:

Learning problem becomes easier/harder with different feature representations, even with the same data!



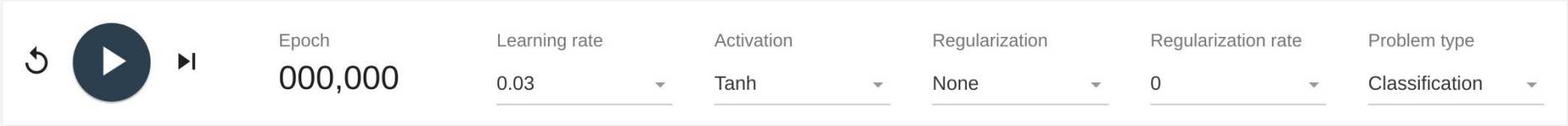
A Learning Model:

Network Structure

Layers

Connectivity

No network works for all the problems!



Training:

Train/Test Loss

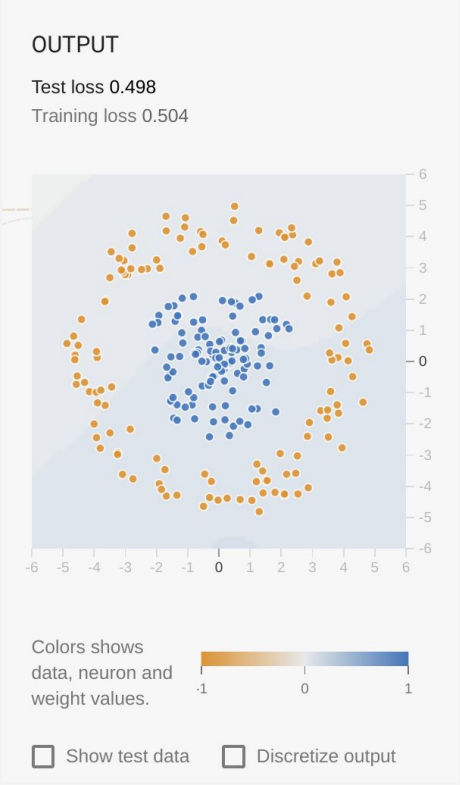
Epochs

Optimization Algorithm

Evaluation:

Metric (accuracy, distance, …)

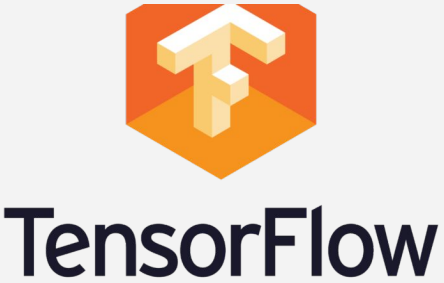
Cross-validation



Next Friday: Deep Learning Frameworks

How to set up a basic deep learning development environment

Python virtualenv, Jupyter Notebook



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DLC Logistics

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