

# Dive into Deep Learning

GTC 2020

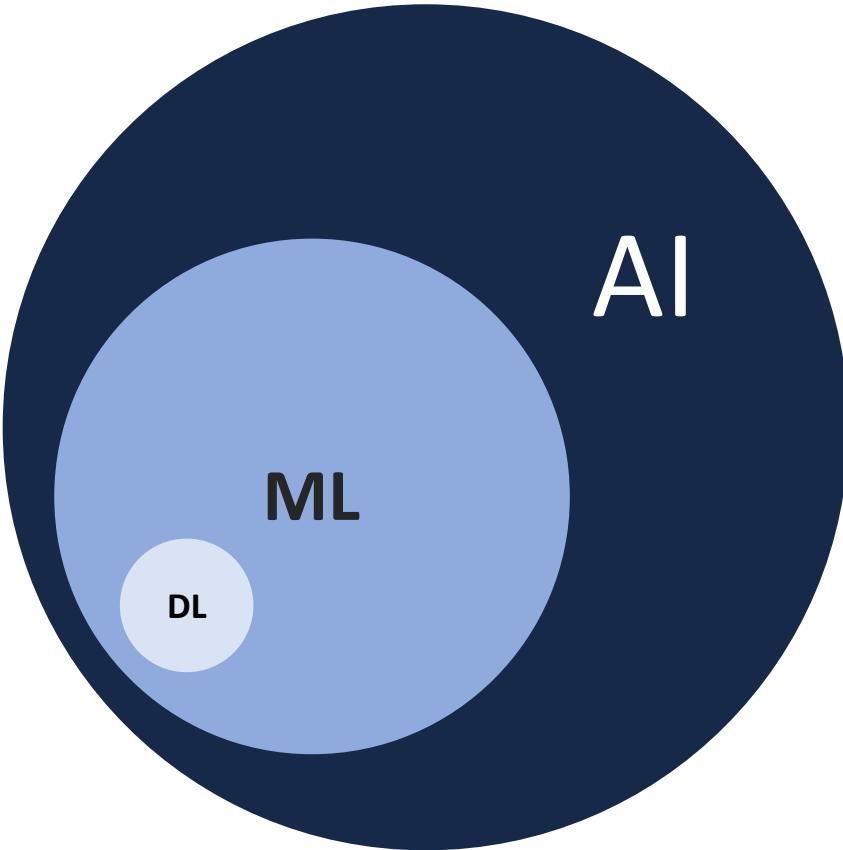
Rachel Hu

Applied Scientist

Amazon AI



# Deep Learning in Context



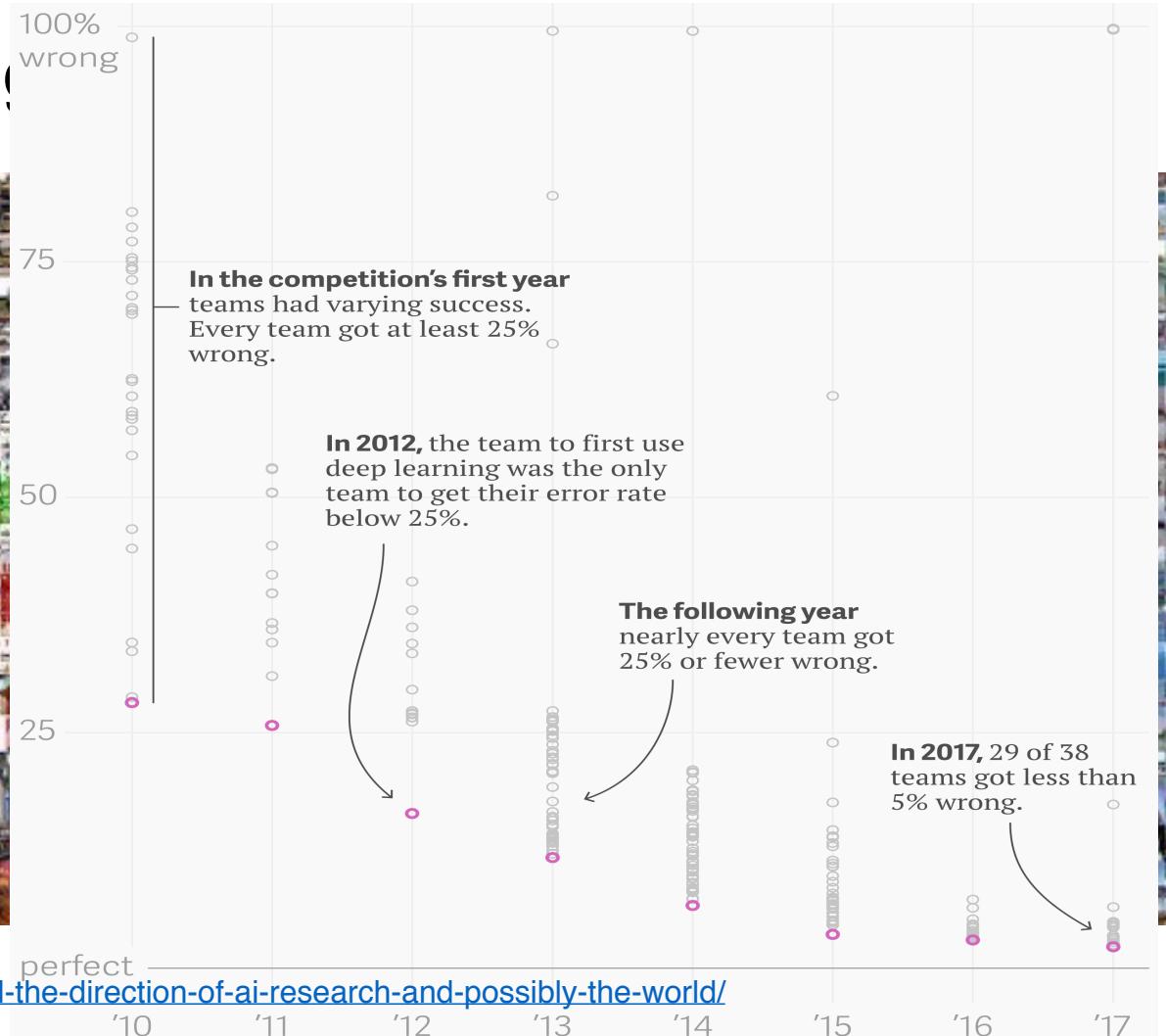
# Why Deep Learning?



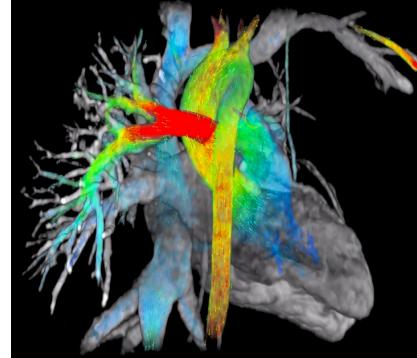
<http://www.image-net.org/>



# Why Deep Learning?



# DL Applications



- Text Documents
  - Images/Videos
  - Bio/Medical Data
  - Satellites Data

# Detect and Segment Objects



[https://github.com/matterport/Mask\\_RCNN](https://github.com/matterport/Mask_RCNN)



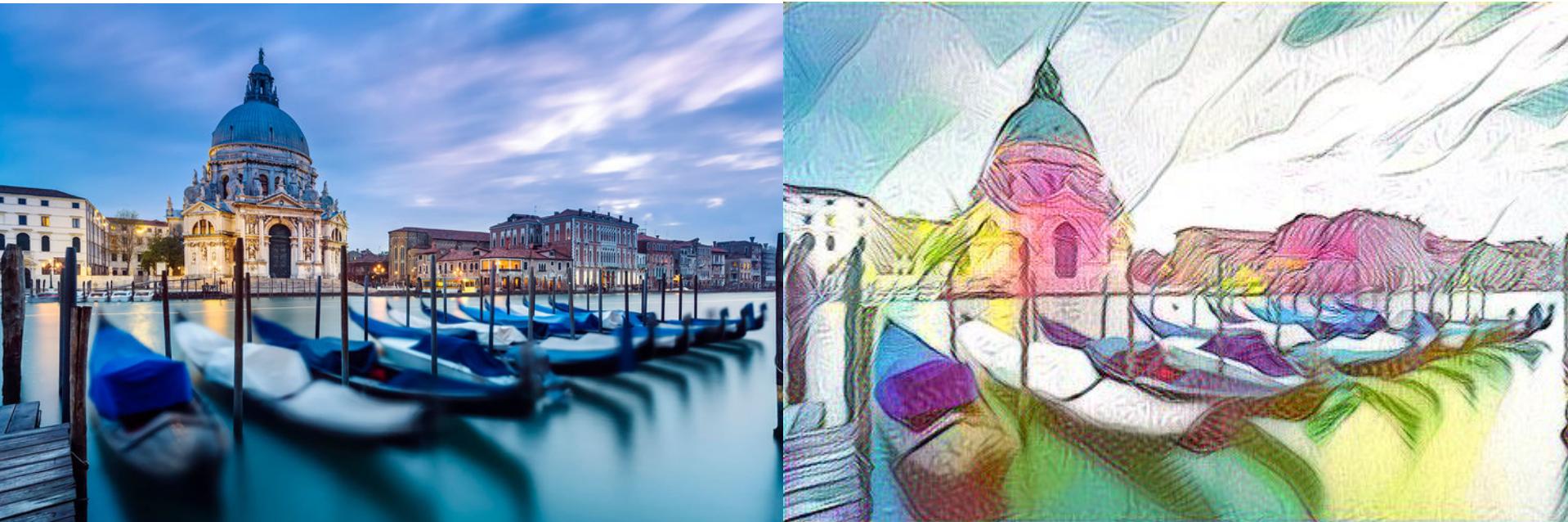
# Style Transfer



<https://github.com/zhanghang1989/MXNet-Gluon-Style-Transfer/>



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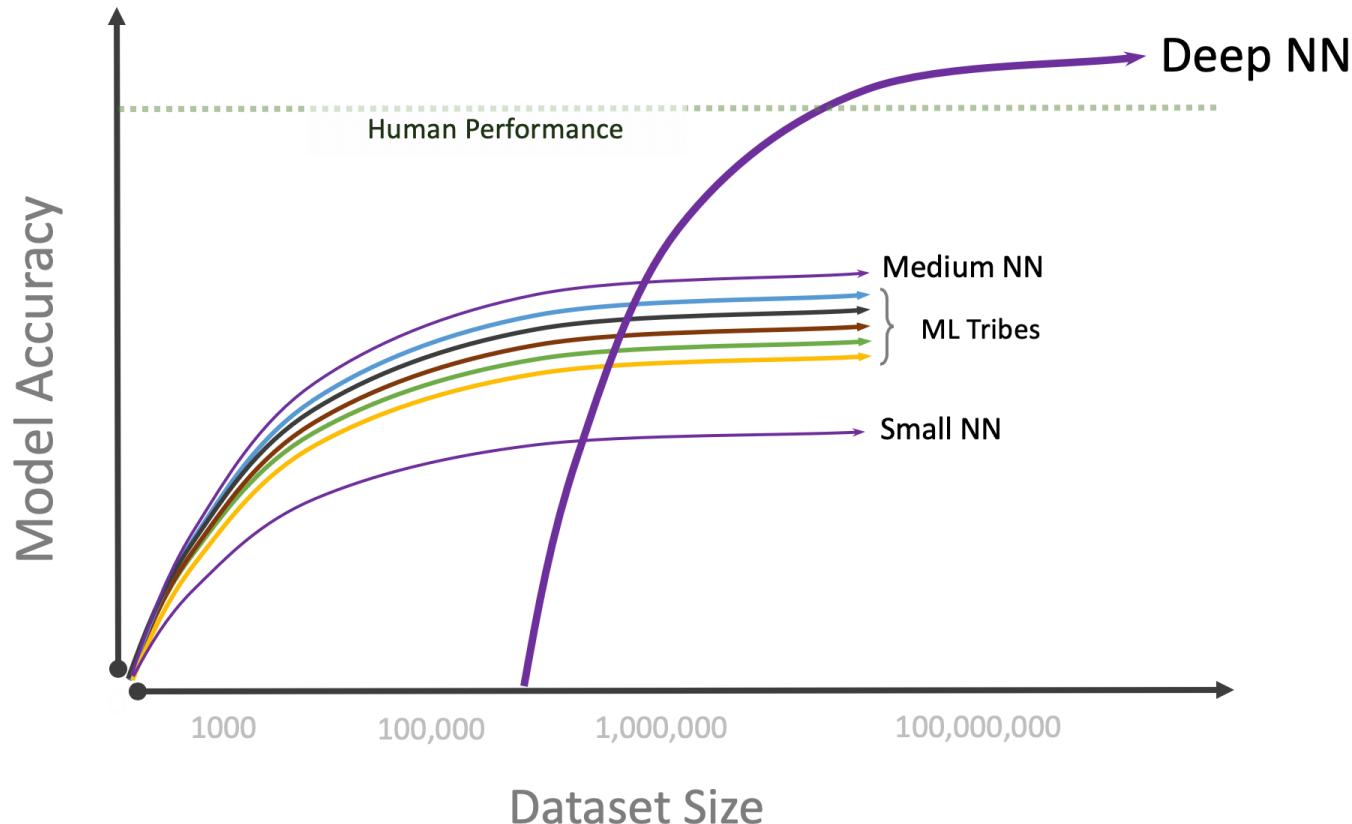
# Synthesize Faces



Karras et al, arXiv 2019

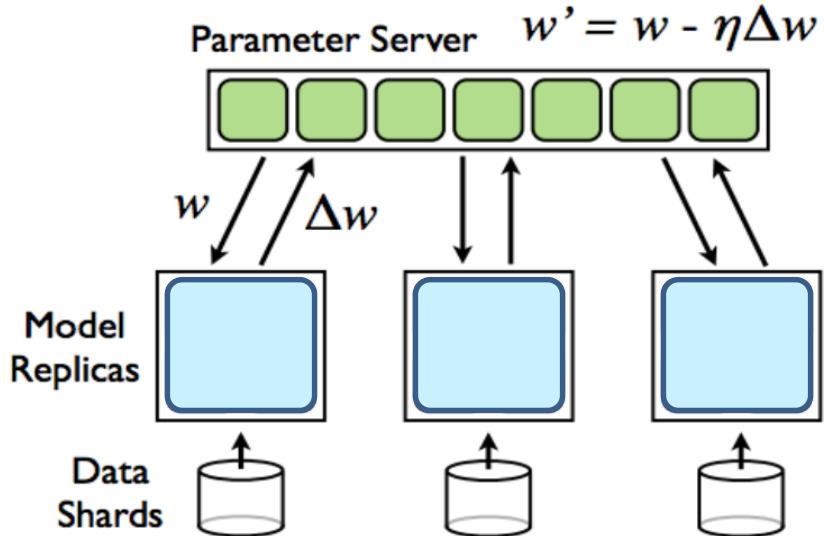
aws

# Learning at Scale



# DL Compute = AWS + NVIDIA

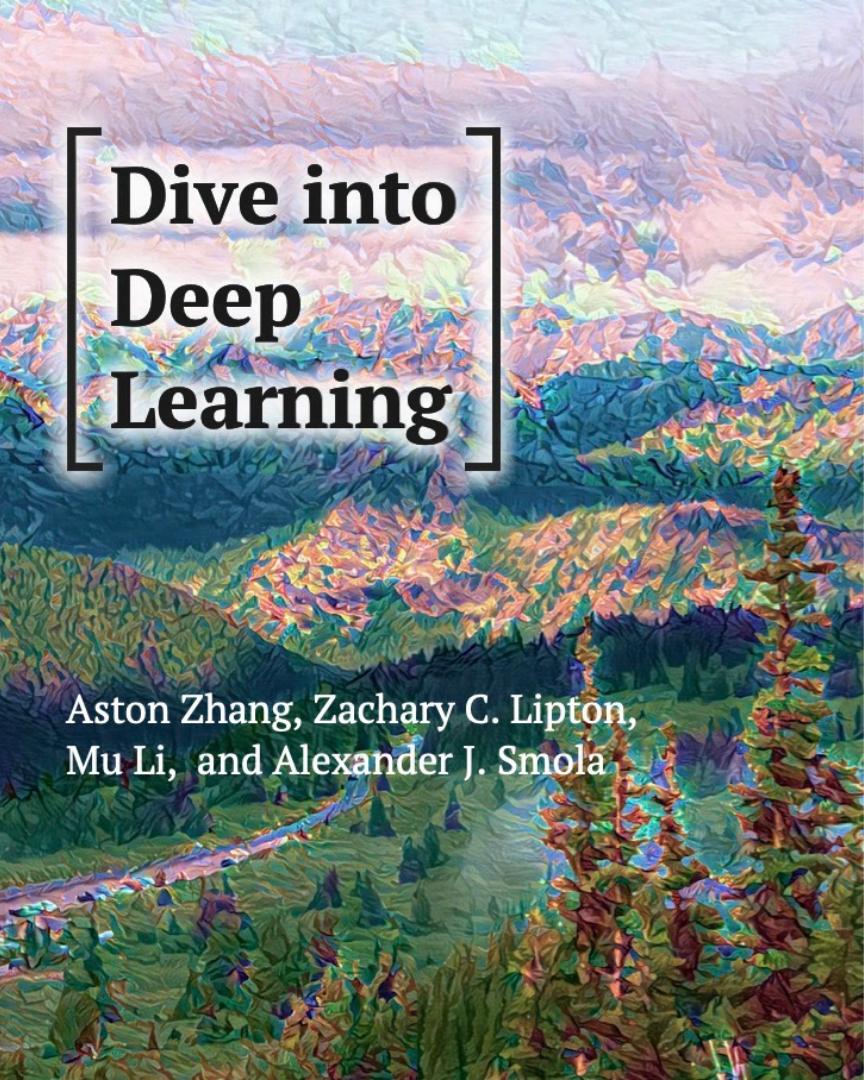
## Parallel Training



## Volta100 [ ec2.p3 ]

5,120 CUDA cores [ 640 Tensor cores ]





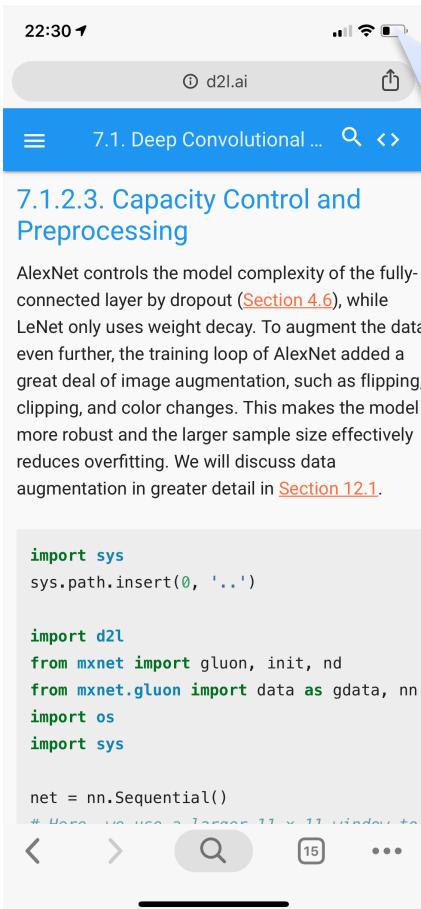
# Dive into Deep Learning

Aston Zhang, Zachary C. Lipton,  
Mu Li, and Alexander J. Smola

- Self-contained tutorials with 150+ Jupyter Notebooks, fully executed
- Adopted as a textbook or reference book at Berkeley, CMU, MIT, and 70+ universities worldwide
- Statistics, linear algebra, optimization, machine learning basics, GPU and parallel examples
- Slides, videos from Berkeley class [courses.d2l.ai](https://courses.d2l.ai)
- Multilingual content EN, ZH (in progress: KO, JA, FR, TR)



# One Code - Multiple Formats & Devices



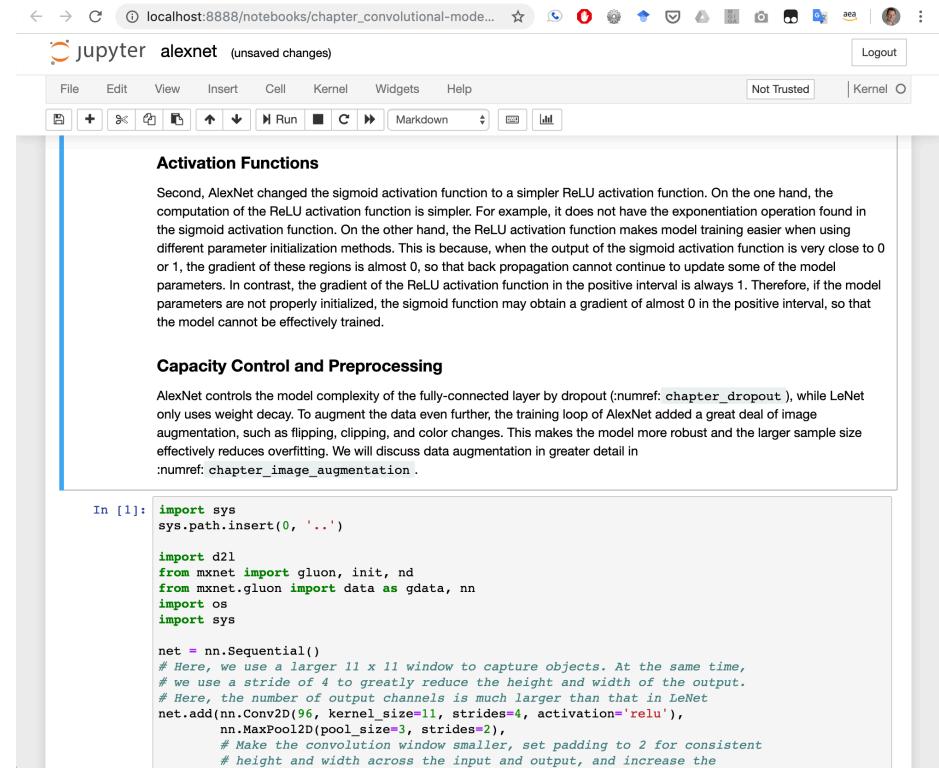
A screenshot of a mobile device displaying a Jupyter Notebook. The top status bar shows the time as 22:30 and signal strength. The browser header indicates the URL is d2l.ai. The notebook page title is "7.1. Deep Convolutional ...". A blue callout bubble labeled "Mobile friendly" points to the mobile device screen.

```
import sys
sys.path.insert(0, '..')

import d2l
from mxnet import gluon, init, nd
from mxnet.gluon import data as gdata, nn
import os
import sys

net = nn.Sequential()
```

# Here, we use a larger 11 x 11 window to capture objects. At the same time,  
# we use a stride of 4 to greatly reduce the height and width of the output.  
# Here, the number of output channels is much larger than that in LeNet  
net.add(nn.Conv2D(96, kernel\_size=11, strides=4, activation='relu'),  
 nn.MaxPool2D(pool\_size=3, strides=2),  
 # Make the convolution window smaller, set padding to 2 for consistent  
 # height and width across the input and output, and increase the



A screenshot of a desktop browser window showing a Jupyter Notebook. The address bar shows the URL localhost:8888/notebooks/chapter\_convolutional-mode... The browser title bar says "jupyter alexnet (unsaved changes)". The notebook interface includes a toolbar with various icons, a sidebar with sections like "Activation Functions" and "Capacity Control and Preprocessing", and a code editor with Python code. A blue callout bubble labeled "Jupyter Notebook" points to the browser window.

```
In [1]: import sys
sys.path.insert(0, '..')

import d2l
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from mxnet.gluon import data as gdata, nn
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# Open Source

d2l-ai / d2l-en

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Code Issues 7 Pull requests 8 Actions Security Insights

Dive into Deep Learning: an interactive deep learning book with code, math, and discussions, based on the NumPy interface.  
<https://d2l.ai>

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astonzhang Update README.md Latest commit 7143d28 8 minutes ago

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- chapter\_attention-mechanisms Typo fixes across repository (#730)
- chapter\_computational-performanc... Typo fixes across repository (#730)
- chapter\_computer-vision Typo fixes across repository (#730)
- chapter\_convolutional-modern Typo fixes across repository (#730)
- chapter\_convolutional-neural-net... Typo fixes across repository (#730)
- chapter\_deep-learning-computati... Typo fixes across repository (#730)
- chapter\_generative-adversarial-n... Typo fixes across repository (#730)

Github:  
Active Development

PDF

Dive into Deep Learning  
Release 0.7

Aston Zhang, Zack C. Lipton, Mu Li, Alex J. Smola

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Date	Topics
1/22	<a href="#">Logistics</a> , <a href="#">Software</a> , <a href="#">Linear Algebra</a>
1/24	<a href="#">Probability and Statistics</a> ( <a href="#">Bayes Rule</a> , <a href="#">Sampling</a> <a href="#">Naive Bayes</a> , <a href="#">Sampling</a> )
1/29	<a href="#">Gradients</a> , <a href="#">Chain Rule</a> , <a href="#">Automatic differentiation</a>
1/31	<a href="#">Linear Regression</a> , <a href="#">Basic Optimization</a>
2/5	<a href="#">Likelihood</a> , <a href="#">Loss Functions</a> , <a href="#">Logisitic Regression</a> , <a href="#">Information Theory</a>
2/7	<a href="#">Multilayer Perceptron</a>
2/12	<a href="#">Model Selection</a> , <a href="#">Weight Decay</a> , <a href="#">Dropout</a>
2/14	<a href="#">Numerical Stability</a> , <a href="#">Hardware</a>
2/19	<a href="#">Environment</a>
2/21	<a href="#">Layers</a> , <a href="#">Parameters</a> , <a href="#">GPUs</a>
2/26	<a href="#">Convolutional Layers</a>

 UC Berkeley Spring '19

# 120+ Videos on YouTube (+20 slide decks)

← → ⌂ https://www.youtube.com/playlist?list=PLZSO\_6-bSqHQHBC... ☆ 🔍 1 📁 🖼 📸 📺 aea

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Logistics

PLAY ALL

Deep Learning UC Berkeley STAT-157 2019

128 videos • 17,182 views • Updated 4 days ago

Alex Smola EDIT

L1/1 Logistics  
Alex Smola Added by Alex Smola

L1/2 Deep Learning Overview  
Alex Smola Added by Alex Smola

L1/3 Software  
Alex Smola Added by Alex Smola

L1/4 Linear Algebra  
Alex Smola Added by Alex Smola

L1/5 Linear Algebra in Jupyter  
Alex Smola Added by Alex Smola



# Dive into Deep Learning

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d2l.ai

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Deep Learning on Graphs

aws