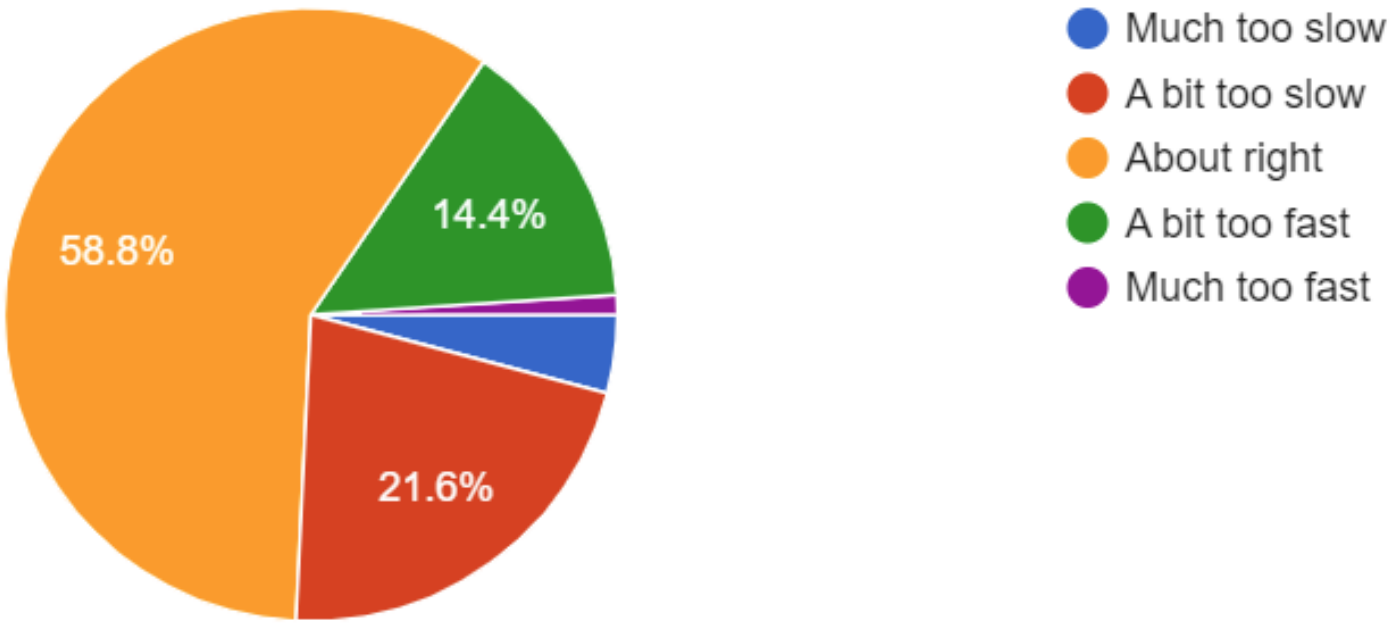
PRACTICAL DEEP LEARNING FOR CODERS

Lesson 3

Jeremy Howard

How is the pace of the course?

97 responses



FAQ, resources, and official course updates

Part 1 2022

jeremy Jeremy Howard (Admin) 9 26d

Welcome to deep learning part 1 v5! This thread will be updated with any important changes to the course, so please keep a close eye on it. Only admins are able to reply to this thread, so please subscribe to topic notifications to ensure you don't miss anything – to do so, click "Normal" at the bottom of this post and change it to "Watching" (if it already says "Watching", then you're already done!)

Getting help

There are help posts for beginner questions, to ensure that your questions aren't missed. If you're really new to all this stuff, then your question is *especially* welcome, since beginners often feel intimidated from posting a question for the first time, and as a result all the many students with that question never actually see it posted!

- Help: Setup 1
- Help: Creating a dataset, and using Gradio / Spaces 1
- Help: Using Colab or Kaggle 1
- Help: Python, git, bash, etc
- Help: SGD and Neural Net foundations 1
- Help: Basics of fastai, PyTorch, numpy, etc 3
- Help: Beginner questions that don't fit elsewhere 2

Premium AU

Search

How to fast.ai

Queensland AI Hub

0:03 / 1:28:05

How to do a fast.ai lesson

Watch lecture

Run notebook & experiment

Reproduce results

Repeat with different dataset

Under the Hood: Training a Digit Classifier

Pixels: The Foundations of Computer Vision

In [ ]:
```
path = untar_data(URLs.MNIST_SAMPLE)
```

In [ ]:
```
#hide
Path.BASE_PATH = path
```

In [ ]:
```
path.ls()
```

In [ ]:
```
(path/'train').ls()
```

In [ ]:
```
threes = (path/'train'/'3').ls().sorted()
sevens = (path/'train'/'7').ls().s
threes
```

In [ ]:
```
im3_path = threes[1]
im3 = Image.open(im3_path)
im3
```

In [ ]:
```
array(im3)[4:10,4:10]
```

In [ ]:
```
tensor(im3)[4:10,4:10]
```

In [ ]:
```
im3_t = tensor(im3)
df = pd.DataFrame(im3_t[4:15,4:22]
df.style.set_properties(**{'font-s
```

First Try: Pixel Similarity

In [ ]:
```
seven_tensors = [tensor(Image.open
three_tensors = [tensor(Image.open(o)) for o in threes]
len(three_tensors),len(seven_tensors)
```

fastai / fastbook

Public

Edit Pins | Watch 474 | Fork 5.5k | Star 14.9k

Code | Issues 46 | Pull requests 4 | Discussions | Actions | Projects

master | Go to file | Add file | Code

jph00 Merge branch 'master' of gith... 4 days ago 487

clean	uncomment	4 days ago
images	update image to match code ...	12 months ago
tools	clean	2 years ago

About

The fastai book, published as Jupyter Notebooks

python data-science machine-learning deep-learning book notebooks fastai

VishnuSubramanian

Inspired by the @suva
characters.

PoonamV Building Jarvislabs.ai 2 7d

brismith Brian Smith

I created a Power App that sent
common raptors I see on my loc
Huggingface Spaces - link in the
some general details of how I di
solution for any low-code people

Which Raptor? PNW Edition

I think this is a Osprey

Hugging Face | Search models, datasets, users... | Models | Datasets | Spaces | Docs | Solutions | Pricing

Spaces: strickvl/redaction-detector | Like | See logs | Running

App | Files and versions | Settings | Linked Models

Redaction Detector for PDFs

An MVP app for detection, extraction and analysis of PDF documents that contain redactions. Two models are used for this demo, both trained on publicly released redacted (and unredacted) FOIA documents:

- Classification model trained using fastai
- Object detection model trained using IceVision

PDF file

test1.pdf

Confidence

80

Analyse and extract redacted images

Clear | Submit

Document Analysis 9.4s

A total of 3 pages were redacted.

The redacted page numbers were: 1, 2, 3.

- 6.2% of the total area of the redacted pages was redacted.
- 7.2% of the actual content of those redacted pages was redacted.

Redacted pages

Redacted page #1 on page 1

1 / 3

Download redacted pages

redacted_pages.pdf 325.0 KB

Interpret

It's not fair that you have to leave. You slam down on the accelerator, speed through a corner and lose control of your car.

1 10d

tos of cities to predict their
turns out it works ok. I sourced
ures of 195 capital cities and

1 6d

genre. I had written a blog post on

auvism, but also as

0.5s

0.1s

m

6%

ugging-face

in training, and for this
ch seems pretty

Spaces: jph00 / **pets** like 3 See logs Running

App | Files and versions | Settings

img

output 0.4s

App | **Files and versions** | Settings

main pets History: 13 commits Add file

jph00 train 9b3c474

.gitattributes	1.23 kB	init	10 days ago
.gitignore	30 Bytes	.gitignore	6 days ago
README.md	245 Bytes	emoji	2 days ago
app.ipynb	143 kB	app.ipynb	3 days ago
app.py	646 Bytes	init	10 days ago
basset.jpg LFS	73 kB	init	10 days ago


fast.ai
family
levit
regnetx
regnety
vit
resnet
efficientnet
resnetv2
convnext
resnetblur
resnetrs
efficientnetv2
regnetz
regnetv
beit
top1
90
85
80
75
70
secs
5
100µ
2
5
0.001
2
5
0.01
2
5

fast.ai

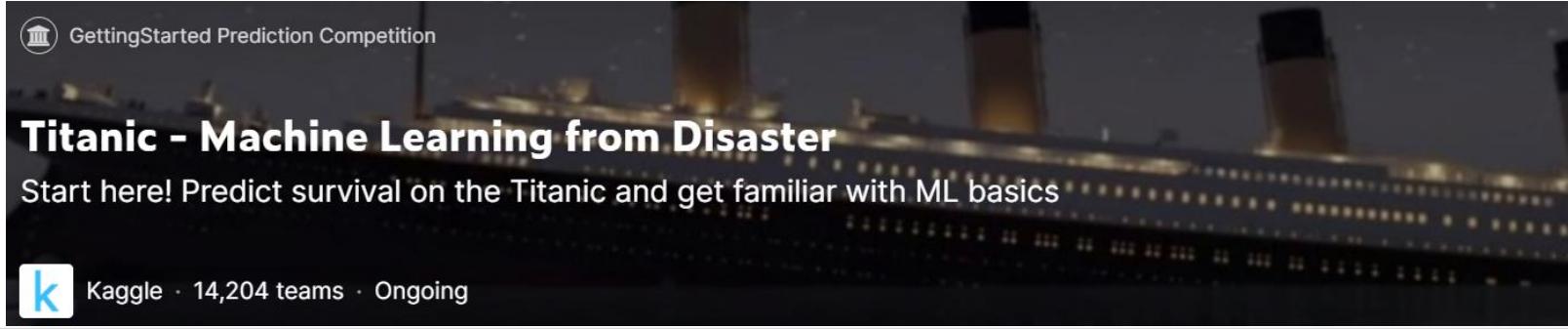
What's a model?
...and how are they made?

```python
m = learn.model
m
```

```
Sequential(
  (0): TimmBody(
    (model): ConvNeXt(
      (stem): Sequential(
        (0): Conv2d(3, 96, kernel_size=(4, 4), stride=(4, 4))
        (1): LayerNorm2d((96,), eps=1e-06, elementwise_affine=True)
      )
      (stages): Sequential(
        (0): ConvNeXtStage(
          (downsample): Identity()
          (blocks): Sequential(
            (0): ConvNeXtBlock(
              (conv_dw): Conv2d(96, 96, kernel_size=(7, 7), stride=(1, 1), padding=(3, 3), groups=96)
              (norm): LayerNorm((96,), eps=1e-06, elementwise_affine=True)
              (mlp): Mlp(
                (fc1): Linear(in_features=96, out_features=384, bias=True)
                (act): GELU()
                (drop1): Dropout(p=0.0, inplace=False)
                (fc2): Linear(in_features=384, out_features=96, bias=True)
```

```python
l = m.get_submodule('0.model.stem.1')
list(l.parameters())
```

```
[Parameter containing:
 tensor([ 1.2545e+00,  1.9196e+00,  1.2201e+00,  1.0390e+00, -1.6480e-03,
          7.6568e-01,  8.8830e-01,  1.6302e+00,  7.0489e-01,  3.2909e+00,
          7.8756e-01, -1.2321e-03,  1.0008e+00, -1.1701e-03,  3.2963e+00,
          7.5332e-04,  1.9848e+00,  1.0214e+00,  4.4530e+00,  2.5485e-01,
          2.7261e+00,  9.2749e-01,  1.2365e+00,  4.6786e-03,  1.7861e+00,
          5.4500e-01,  4.6252e+00,  1.1814e-02, -8.0696e-04,  3.4503e+00,
          1.3520e+00,  4.1267e+00,  2.6889e+00,  4.1214e+00,  3.4020e+00,
          8.4680e-01,  7.3639e-01,  3.9801e+00,  1.2857e+00,  6.4153e-01,
          2.6896e+00,  1.1183e+00,  1.1701e+00,  5.5256e-01,  2.3371e+00,
          2.6110e-04,  9.7016e-01,  2.1527e-03,  1.1990e+00,  1.7883e+00,
          4.0231e-01,  4.4849e-01,  9.7238e-01,  3.9889e+00,  6.5864e-01,
```



log_Fare	Pclass_1	Pclass_2	Embark_S	Embark_C	Male	Ones
0.92	0	0	1	0	1	1
1.86	1	0	0	1	0	1
0.95	0	0	1	0	0	1
1.73	1	0	1	0	0	1
0.96	0	0	1	0	1	1
1.72	1	0	1	0	1	1
1.34	0	0	1	0	1	1
1.08	0	0	1	0	0	1
1.49	0	1	0	1	0	1
1.25	0	0	1	0	0	1
1.44	1	0	1	0	0	1
0.96	0	0	1	0	1	1
1.51	0	0	1	0	1	1
0.95	0	0	1	0	0	1
1.23	0	1	1	0	0	1
1.48	0	0	0	0	1	1
1.28	0	0	1	0	0	1
1.43	0	1	1	0	1	1
1.15	0	1	1	0	1	1
0.96	0	0	0	0	0	1
1.56	1	0	1	0	1	1

Params

Column	Param1	Param2
SibSp	0.31	-0.01
Parch	-0.07	0.14
Age_N	0.15	0.35
log_Fare	0.10	-0.16
Pclass_1	-0.04	0.23
Pclass_2	0.22	-0.21
Embark_S	-0.50	0.22
Embark_C	-0.24	-0.32
Male	-0.32	-0.18
Ones	0.02	-0.04

Model

Total loss: 17.38

Lin1	Lin2	ReLU1	ReLU2	Preds	Loss
-0.35	-0.06	0.00	0.00	0.00	0.00
0.31	-0.26	0.31	0.00	0.31	0.48
-0.33	0.15	0.00	0.15	0.15	0.73
0.03	0.28	0.03	0.28	0.32	0.47
-0.63	0.00	0.00	0.00	0.00	0.00
-0.56	0.20	0.00	0.20	0.20	0.04
0.20	-0.10	0.20	0.00	0.20	0.04
-0.46	0.41	0.00	0.41	0.41	0.35
0.49	-0.75	0.49	0.00	0.49	0.26
-0.10	0.13	0.00	0.13	0.13	0.76
-0.26	0.44	0.00	0.44	0.44	0.31
-0.66	-0.06	0.00	0.00	0.00	0.00
-0.61	0.62	0.00	0.62	0.62	0.39
-0.35	0.09	0.00	0.09	0.09	0.01
-0.02	0.02	0.00	0.02	0.02	0.96
1.02	-0.35	1.02	0.00	1.02	1.03
0.02	0.10	0.02	0.10	0.12	0.02
-0.36	-0.28	0.00	0.00	0.00	0.00
-0.39	-0.24	0.00	0.00	0.00	1.00
0.15	-0.12	0.15	0.00	0.15	0.73
-0.62	0.11	0.00	0.11	0.11	0.79

Not secure | matrixmultiplication.xyz

Matrix Multiplication

$$\begin{bmatrix} 1 & 2 \\ 0 & 1 \\ 2 & 3 \end{bmatrix} \times \begin{bmatrix} 2 & 5 \\ 6 & 7 \end{bmatrix} = \begin{bmatrix} 14 & 19 \\ 6 & 7 \\ 22 & 31 \end{bmatrix}$$

Getting started with NLP for absolute beginners

Getting started with Kaggle, NLP and HuggingFace for absolute beginners

One area where deep learning has dramatically improved in the last couple of years is natural language processing (NLP). Computers can now generate text, translate automatically from one language to another, analyze comments, label words in sentences, and much more.

Perhaps the most widely practically useful application of NLP is *classification* -- that is, classifying a document automatically into some category. This can be used, for instance, for:

- Sentiment analysis (e.g are people saying *positive* or *negative* things about your product)
- Author identification (what author most likely wrote some document)
- Legal discovery (which documents are in scope for a trial)
- Organizing documents by topic
- Triaging inbound emails
- ...and much more!