

Programación con fastai

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Introducción: ¿fastai o fast.ai?

- fast.ai es un grupo de investigación centrado en el aprendizaje profundo y la inteligencia artificial. Fue fundado en 2016 por Jeremy Howard y Rachel Thomas con el objetivo de democratizar el aprendizaje profundo.
- Imparten un curso online masivo y abierto (MOOC) llamado "Practical Deep Learning for Coders".
- En otoño de 2018, fast.ai lanzó la v1.0 de su biblioteca gratuita de código abierto para el aprendizaje profundo llamada fastai (sin punto).

Introducción

- Su objetivo es hacer ambas cosas sin comprometer sustancialmente la facilidad de uso, la flexibilidad o el rendimiento.
- Estas abstracciones pueden expresarse de forma concisa y clara aprovechando el dinamismo del lenguaje Python y la flexibilidad de la biblioteca PyTorch.
- PyTorch es una biblioteca de aprendizaje automático basada en la biblioteca Torch, utilizada para aplicaciones como visión por ordenador y procesamiento del lenguaje natural, es desarrollada principalmente por Facebook.

Introducción

fastai incluye entre otras cosas:

- Sistema de tipos junto con una jerarquía de tipos semántica para tensores.
- Biblioteca de visión por ordenador optimizada para la GPU
- Un optimizador que permite implementar algoritmos de optimización en 4-5 líneas de código.
- Un sistema de callbacks de dos vías que puede acceder a cualquier parte de los datos, el modelo o el optimizador y cambiarlo en cualquier momento durante el entrenamiento.
- Una API de DataBlocks.

Applications

Vision

Text

Tabular

Collab

High level API

Learner

DataBlock

Mid level API

Callbacks

Generic
Optimizer

General
Metric

Data
Core

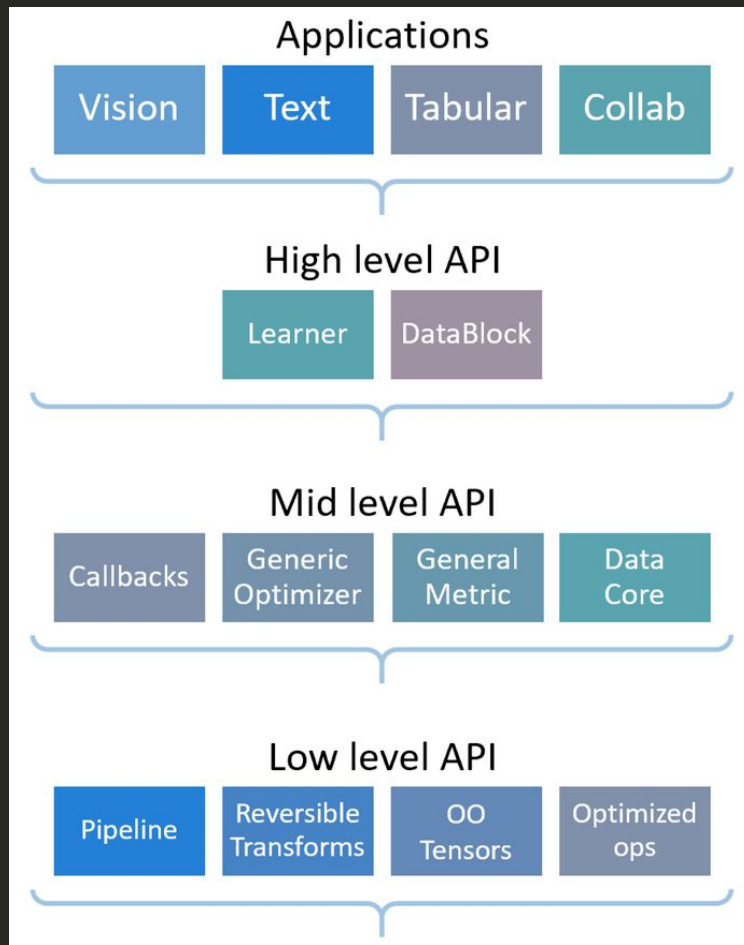
Low level API

Pipeline

Reversible
Transforms

OO
Tensors

Optimized
ops



Flujo de trabajo con fastai

- Crear los DataLoaders adecuados
- Crear un Learner
- Llamar a un método fit
- Hacer predicciones o ver los resultados.

DataLoaders y Learner

- La clase DataLoaders es una envoltura básica de varios DataLoaders. La clase DataLoader (singular) es una extensión de la clase DataLoader de PyTorch.
- En PyTorch la primitiva Dataset almacena las muestras y sus correspondientes etiquetas, y DataLoader la envuelve en un objeto iterable para permitir un fácil acceso a las muestras.
- La clase learner agrupa un modelo, unos DataLoaders y una función de pérdida. Con estos parámetros es suficiente para entrenar la red neuronal.

Ejemplo 1: Clasificación de razas de perros y gatos

```
1  from fastai.vision.all import *
2  path = untar_data(URLs.PETS)
3  files = get_image_files(path/"images")
4  pat = r'^(.*)_d+.jpg'
5  dls = ImageDataLoaders.from_name_re(path, files, pat, item_tfms = Resize(460), batch_tfms =
    aug_transforms(size=224))
6  dls.show_batch()
7  learn = cnn_learner(dls, resnet34, metrics=error_rate)
8  learn.lr_find()
9  learn.fine_tune(2, 3e-3)
10 learn.show_results()
11 interp = Interpretation.from_learner(learn)
12 interp.plot_top_losses(9, figsize=(15,10))
```

`dls.show_batch()`

Bombay



american_bulldog



saint_bernard



english_setter



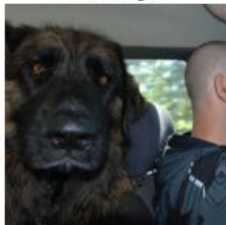
japanese_chin



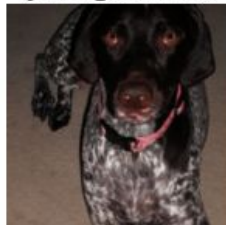
pug



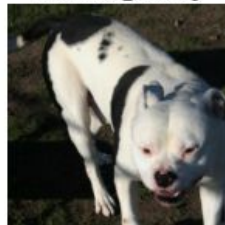
leonberger



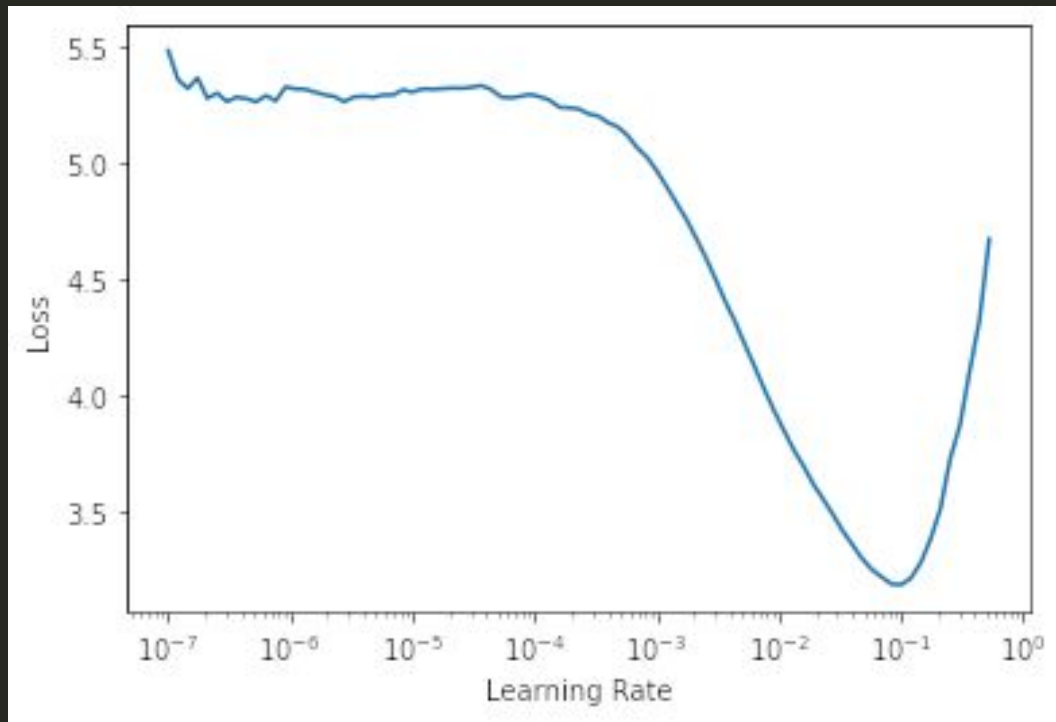
german_shorthaired



american_bulldog



```
learn.lr_find()
```

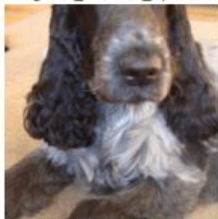


learn.show_results()

yorkshire_terrier
yorkshire_terrier



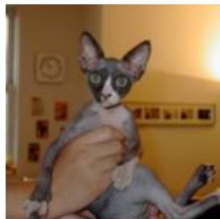
english_cocker_spaniel
english_cocker_spaniel



american_bulldog
american_bulldog



Sphynx
chihuahua



shiba_inu
shiba_inu



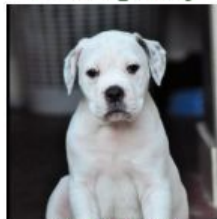
Abyssinian
Abyssinian



British_Shorthair
British_Shorthair



american_bulldog
american_bulldog



yorkshire_terrier
yorkshire_terrier



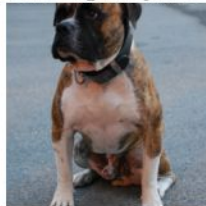
```
interp.plot_top_losses(9, figsize=(15,10))
```

Prediction/Actual/Loss/Probability

chihuahua/saint_bernard / 12.14 / 0.98



boxer/american_bulldog / 7.88 / 1.00



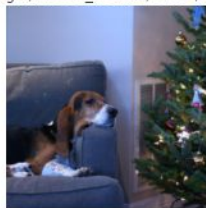
saint_bernard/boxer / 6.49 / 0.53



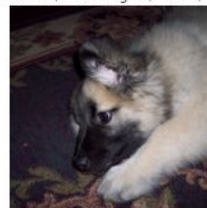
leonberger/keeshond / 6.28 / 1.00



beagle/basset_hound / 6.19 / 1.00



keeshond/leonberger / 5.80 / 0.99



Russian_Blue/Abyssinian / 5.60 / 0.85



yorkshire_terrier/havanese / 5.54 / 0.93



american_bulldog/basset_hound / 5.14 / 0.75



Ejemplo 2: Críticas en IMDb

```
1 from fastai.text.all import *
2 path = untar_data(URLs.IMDB)
3 dls = TextDataLoaders.from_folder(untar_data(URLs.IMDB), valid='test')
4 dls.show_batch()
5 learn = text_classifier_learner(dls, AWD_LSTM, drop_mult=0.5, metrics=accuracy)
6 learn.fine_tune(4, 1e-2)
7 learn.show_results()
8 learn.predict("I really liked that movie!")
```

Salida de predict: ('pos', tensor(1), tensor([0.0092, 0.9908]))

dls.show_batch()

	text	category
0	xxbos xxmaj match 1 : xxmaj tag xxmaj team xxmaj table xxmaj match xxmaj bubba xxmaj ray and xxmaj spike xxmaj dudley vs xxmaj eddie xxmaj guerrero and xxmaj chris xxmaj benoit xxmaj bubba xxmaj ray and xxmaj spike xxmaj dudley started things off with a xxmaj tag xxmaj team xxmaj table xxmaj match against xxmaj eddie xxmaj guerrero and xxmaj chris xxmaj benoit . xxmaj according to the rules of the match , both opponents have to go through tables in order to get the win . xxmaj benoit and xxmaj guerrero heated up early on by taking turns hammering first xxmaj spike and then xxmaj bubba xxmaj ray . a xxmaj german xxunk by xxmaj benoit to xxmaj bubba took the wind out of the xxmaj dudley brother . xxmaj spike tried to help his brother , but the referee restrained him while xxmaj benoit and xxmaj guerrero	pos
1	xxbos xxmaj warning : xxmaj does contain spoilers . \n\n xxmaj open xxmaj your xxmaj eyes \n\n xxmaj if you have not seen this film and plan on doing so , just stop reading here and take my word for it . xxmaj you have to see this film . i have seen it four times so far and i still have n't made up my mind as to what exactly happened in the film . xxmaj that is all i am going to say because if you have not seen this film , then stop reading right now . \n\n xxmaj if you are still reading then i am going to pose some questions to you and maybe if anyone has any answers you can email me and let me know what you think . \n\n i remember my xxmaj grade 11 xxmaj english teacher quite well . xxmaj	pos

learn.show_results()

	text	category	category_
0	xxbos xxmaj there 's a sign on xxmaj the xxmaj lost xxmaj highway that says : \n\n * major xxup spoilers xxup ahead * \n\n (but you already knew that , did n't you ?) \n\n xxmaj since there 's a great deal of people that apparently did not get the point of this movie , xxmaj i 'd like to contribute my interpretation of why the plot makes perfect sense . xxmaj as others have pointed out , one single viewing of this movie is not sufficient . xxmaj if you have the xxup dvd of xxup md , you can " cheat " by looking at xxmaj david xxmaj lynch 's " top 10 xxmaj hints to xxmaj unlocking xxup md " (but only upon second or third viewing , please .) ; \n\n xxmaj first of all , xxmaj mulholland xxmaj drive is	pos	pos
1	xxbos (some spoilers included :) \n\n xxmaj although , many commentators have called this film surreal , the term fits poorly here . xxmaj to quote from xxmaj encyclopedia xxmaj xxunk 's , surreal means : \n\n " fantastic or incongruous imagery " : xxmaj one need n't explain to the unimaginative how many ways a plucky ten - year - old boy at large and seeking his fortune in the driver 's seat of a red xxmaj mustang could be fantastic : those curious might read xxmaj james xxmaj kincaid ; but if you asked said lad how he were incongruous behind the wheel of a sports car , he 'd surely protest , " no way ! " xxmaj what fantasies and incongruities the film offers mostly appear within the first fifteen minutes . xxmaj thereafter we get more iterations of the same , in an	pos	neg
2	xxbos xxmaj hearkening back to those " good xxmaj old xxmaj days " of 1971 , we can vividly recall when we were treated with a whole xxmaj season of xxmaj charles xxmaj chaplin at the xxmaj cinema . xxmaj that 's what the promotional guy called it when we saw him on somebody 's old talk show . (we ca n't recall just whose it was ; either xxup merv xxup griffin or xxup woody xxup woodbury , one or the other !) xxmaj the guest talked about xxmaj sir xxmaj charles ' career and how his films had been out of circulation ever since the 1952 exclusion of the former " little xxmaj tramp ' from xxmaj los xxmaj xxunk xxmaj xxunk on the grounds of his being an " undesirable xxmaj alien " . (no xxmaj schultz , he 's xxup not from another	pos	pos

FIN