

```
In [1]: %reload_ext autoreload
%autoreload 2
%matplotlib inline
from IPython.display import Audio
```

```
In [2]: from fastai.conv_learner import *
```

```
In [3]: PATH = 'data/dogbreeds/'
sz = 256
bs = 15
```

```
In [5]: ls {PATH}

labels.csv  probs.pkl  sample_submission.csv  subm/  test/  tmp/  train/
```

```
In [6]: from fastai.plots import *
```

```
In [7]: f_model = resnext101_64
arch = f_model
```

```
In [8]: label_csv = f'{PATH}labels.csv'
n = len(list(open(label_csv)))-1
val_idx = get_cv_idx(n)
```

```
In [9]: def get_data(sz,bs):
    tfms = tfms_from_model(arch, sz, aug_tfms = transforms_side_on, max_zoom=1.1)
    data = ImageClassifierData.from_csv(PATH, 'train', f'{PATH}labels.csv', test_
        val_idx=val_idx, suffix='.jpg', tfms=tfm
    return data if sz>300 else data.resize(340,'tmp')
```

```
In [10]: data = get_data(sz,bs)
Audio(url="CHORD.WAV", autoplay=True)
```

100% 6/6 [00:00<00:00, 244.58it/s]

Out[10]: 0:01 / 0:01

```
In [11]: data = data.resize(int(sz*1.3), 'tmp')
Audio(url="CHORD.WAV", autoplay=True)
```

100% 6/6 [00:00<00:00, 200.58it/s]

Out[11]: 0:01 / 0:01

```
In [18]: learn = ConvLearner.pretrained(f_model, data, precompute = True)
Audio(url="CHORD.WAV", autoplay=True)
```

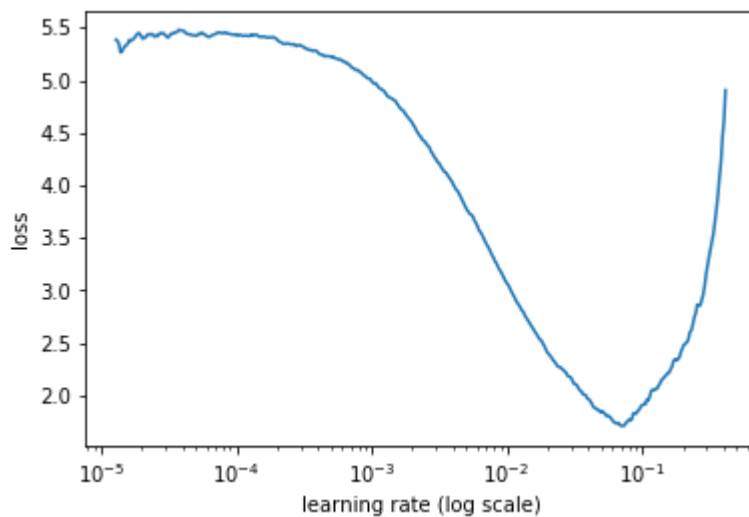
Out[18]: 0:01 / 0:01

```
In [19]: lrf=learn.lr_find()
learn.sched.plot()
Audio(url="CHORD.WAV", autoplay=True)
```

Epoch 0% 0/1 [00:00<?, ?it/s]

76% |██████████| 413/546 [00:03<00:01, 114.91it/s, loss=7]

Out[19]: 0:01 / 0:01



```
In [22]: lr = 0.008
```

```
In [23]: learn.fit(lr, 1)
         Audio(url="CHORD.WAV", autoplay=True)
```

Epoch 100% 1/1 [00:04<00:00, 4.52s/it]

epoch	trn_loss	val_loss	accuracy
0	0.357585	0.330824	0.903163

Out[23]: 0:01 / 0:01

```
In [24]: learn.precompute = False
```

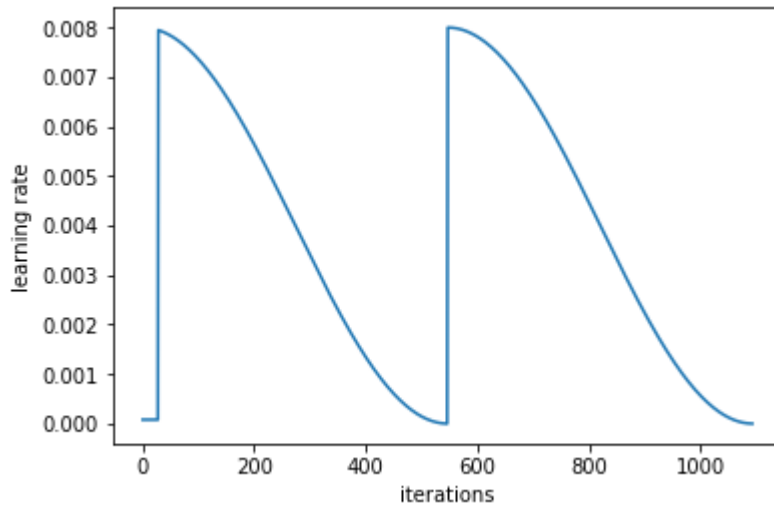
```
In [25]: learn.fit(lr, 2, cycle_len=1)
         Audio(url="CHORD.WAV", autoplay=True)
```

Epoch 100% 2/2 [04:00<00:00, 120.24s/it]

epoch	trn_loss	val_loss	accuracy
0	0.342512	0.243564	0.922628
1	0.317367	0.245215	0.918248

Out[25]: 0:01 / 0:01

```
In [26]: learn.sched.plot_lr()
```

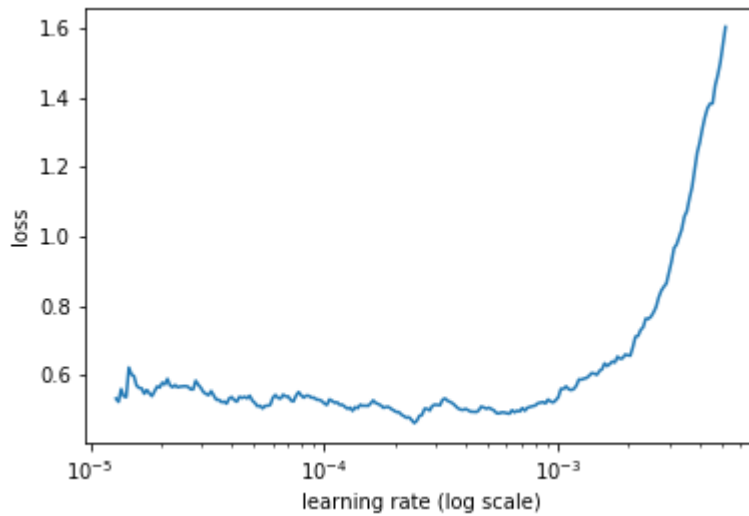


```
In [27]: learn.unfreeze()
```

```
In [28]: lrf=learn.lr_find()  
learn.sched.plot()  
Audio(url="CHORD.WAV", autoplay=True)
```

Epoch 0% 0/1 [00:00<?, ?it/s]
46% |██████| | 253/546 [02:28<02:52, 1.70it/s, loss=1.89]

Out[28]: 0:01 / 0:01



```
In [39]: learn.save("tmp")
```

```
In [ ]: learn.load("tmp")
```

```
In [29]: lr=np.array([1e-4, 5e-5, 1e-5])
```

```
In [30]: learn.fit(lr, 3, cycle_len=1, cycle_mult=2)
         Audio(url="CHORD.WAV", autoplay=True)
```

```
Epoch 100% 7/7 [40:18<00:00, 345.49s/it]
```

```
0%|          | 1/546 [00:00<07:00, 1.30it/s, loss=0.715]
```

Exception in thread Thread-22:

Traceback (most recent call last):

File "/home/paperspace/anaconda3/envs/fastai/lib/python3.6/threading.py", line 916, in _bootstrap_inner

self.run()

File "/home/paperspace/anaconda3/envs/fastai/lib/python3.6/site-packages/tqdm/tqdm.py", line 144, in run

for instance in self.tqdm_cls._instances:

File "/home/paperspace/anaconda3/envs/fastai/lib/python3.6/_weakrefset.py", line 60, in __iter__

for itemref in self.data:

RuntimeError: Set changed size during iteration

epoch	trn_loss	val_loss	accuracy
0	0.498375	0.287899	0.906569
1	0.469744	0.272371	0.909489
2	0.433933	0.273979	0.908029
3	0.358977	0.268865	0.911922
4	0.347617	0.262947	0.913869
5	0.370512	0.25978	0.916302
6	0.351637	0.265487	0.915328

```
Out[30]: 0:01 / 0:01
```

```
In [42]: learn.save("tmp2")
```

```
In [43]: data.classes
        'irish_terrier',
        'irish_water_spaniel',
        'irish_wolfhound',
        'italian_greyhound',
        'japanese_spaniel',
        'keeshond',
        'kelpie',
        'kerry_blue_terrier',
        'komondor',
        'kuvasz',
        'labrador_retriever',
        'lakeland_terrier',
        'leonberg',
        'lhasa',
        'malamute',
        'malinois',
        'maltese_dog',
        'mexican_hairless',
        'miniature_pinscher',
        'miniature_poodle',
        .
        .
        .
```

```
In [33]: log_preds,y = learn.TTA(True)
        probs = np.exp(log_preds)
        probs.shape
```

Out[33]: (2, 2044, 120)

```
In [31]: log_preds,y = learn.TTA(is_test = True)
        Audio(url="CHORD.WAV", autoplay=True)
```

Out[31]: 0:01 / 0:01

```
In [32]: probs = np.exp(log_preds)
        probs.shape
```

Out[32]: (5, 10357, 120)

```
In [57]: ds = pd.DataFrame(probs[0]) #Take the 1st one out of the 5
        ds.columns = data.classes
        ds.insert(0, 'id', [o[5:-4] for o in data.test_ds.fnames])
        SUBM = f'{PATH}subm/'
        os.makedirs(SUBM, exist_ok=True)
        ds.to_csv(f'{SUBM}subm.gz', compression='gzip', index=False)
        FileLink(f'{SUBM}subm.gz')
```

Out[57]: <data/dogbreeds/subm/subm.gz> (data/dogbreeds/subm/subm.gz)

```
In [58]: from sklearn.externals import joblib
joblib.dump(probs, f'{PATH}probs.pkl')
```

```
Out[58]: ['data/dogbreeds/probs.pkl']
```

```
In [34]: FileLink("dogbreeds.ipynb")
```

```
Out[34]: dogbreeds.ipynb (dogbreeds.ipynb)
```

```
In [36]: FileLink("CHORD.WAV")
```

```
Out[36]: CHORD.WAV (CHORD.WAV)
```

```
In [ ]:
```