

```
In [1]: import pandas as pd
import os
import numpy as np
from sklearn.model_selection import RepeatedStratifiedFold
from fastai import *
from fastai.vision import *
from fastai.callbacks import *
```

```
In [2]: df_Test_Train = pd.read_csv('Fastai_dataset_usable_d14.csv')
df_Test_Train.drop(df_Test_Train.columns[df_Test_Train.columns.str.contains('unnamed',case = False)],axis = 1, inplace = True)
df_Test_Train.head(100)
```

Out[2]:

	Crp_Filepath	clutch	Day	egg_number	sex
0	Cropped_Egg_images/Clutch2_D14IMG_0002.JPG	2	14	1	Female
1	Cropped_Egg_images/Clutch2_D14IMG_0003.JPG	2	14	2	Male
2	Cropped_Egg_images/Clutch2_D14IMG_0007.JPG	2	14	6	Female
3	Cropped_Egg_images/Clutch2_D14IMG_0008.JPG	2	14	7	Female
4	Cropped_Egg_images/Clutch2_D14IMG_0010.JPG	2	14	9	Male
5	Cropped_Egg_images/Clutch2_D14IMG_0013.JPG	2	14	12	Male
6	Cropped_Egg_images/Clutch2_D14IMG_0014.JPG	2	14	13	Female
7	Cropped_Egg_images/Clutch2_D14IMG_0016.JPG	2	14	15	Female
8	Cropped_Egg_images/Clutch2_D14IMG_0018.JPG	2	14	17	Female
9	Cropped_Egg_images/Clutch2_D14IMG_0022.JPG	2	14	21	Female
10	Cropped_Egg_images/Clutch2_D14IMG_0026.JPG	2	14	24	Female
11	Cropped_Egg_images/Clutch2_D14IMG_0027.JPG	2	14	26	Male
12	Cropped_Egg_images/Clutch2_D14IMG_0028.JPG	2	14	27	Male
13	Cropped_Egg_images/Clutch2_D14IMG_0029.JPG	2	14	28	Male
14	Cropped_Egg_images/Clutch2_D14IMG_0030.JPG	2	14	29	Female
15	Cropped_Egg_images/Clutch2_D14IMG_0033.JPG	2	14	32	Male
16	Cropped_Egg_images/Clutch2_D14IMG_0034.JPG	2	14	33	Female
17	Cropped_Egg_images/Clutch2_D14IMG_0035.JPG	2	14	34	Female
18	Cropped_Egg_images/Clutch2_D14IMG_0036.JPG	2	14	35	Female
19	Cropped_Egg_images/Clutch2_D14IMG_0037.JPG	2	14	36	Male
20	Cropped_Egg_images/Clutch2_D14IMG_0038.JPG	2	14	37	Male
21	Cropped_Egg_images/Clutch2_D14IMG_0039.JPG	2	14	38	Female
22	Cropped_Egg_images/Clutch2_D14IMG_0040.JPG	2	14	39	Male
23	Cropped_Egg_images/Clutch2_D14IMG_0042.JPG	2	14	41	Male
24	Cropped_Egg_images/Clutch2_D14IMG_0043.JPG	2	14	42	Male
25	Cropped_Egg_images/Clutch2_D14IMG_0046.JPG	2	14	45	Female
26	Cropped_Egg_images/Clutch2_D14IMG_0047.JPG	2	14	46	Male
27	Cropped_Egg_images/Clutch2_D14IMG_0050.JPG	2	14	49	Male
28	Cropped_Egg_images/Clutch2_D14IMG_0052.JPG	2	14	51	Female
29	Cropped_Egg_images/Clutch2_D14IMG_0053.JPG	2	14	52	Female
30	Cropped_Egg_images/Clutch2_D14IMG_0055.JPG	2	14	54	Male
31	Cropped_Egg_images/Clutch2_D14IMG_0056.JPG	2	14	55	Female
32	Cropped_Egg_images/Clutch2_D14IMG_0057.JPG	2	14	56	Female
33	Cropped_Egg_images/Clutch2_D14IMG_0058.JPG	2	14	57	Female
34	Cropped_Egg_images/Clutch2_D14IMG_0059.JPG	2	14	58	Male
35	Cropped_Egg_images/Clutch2_D14IMG_0062.JPG	2	14	61	Male
36	Cropped_Egg_images/Clutch2_D14IMG_0063.JPG	2	14	62	Female
37	Cropped_Egg_images/Clutch2_D14IMG_0066.JPG	2	14	65	Male
38	Cropped_Egg_images/Clutch2_D14IMG_0067.JPG	2	14	66	Male

```
In [3]: from sklearn.metrics import roc_auc_score

def auroc_score(input, target):
    input, target = input.cpu().numpy()[1:], target.cpu().numpy()
    return roc_auc_score(target, input)

class AUROC(Callback):
    _order = -28 #needs to run before the recorder

    def __init__(self, learn,extra=None,**kwargs):
        self.learn = learn
    def on_train_begin(self,**kwargs):
        self.learn.recorder.add_metric_names(['AUROC'])
    def on_epoch_begin(self,**kwargs):
        self.output, self.target = [], []

    def on_batch_end(self, last_target, last_output, train,**kwargs):
        if not train:
            self.output.append(last_output)
            self.target.append(last_target)

    def on_epoch_end(self, last_metrics,**kwargs):
        if len(self.output) > 0:
            output = torch.cat(self.output)
            target = torch.cat(self.target)
            preds = F.softmax(output, dim=1)
            metric = auroc_score(preds, target)
            return add_metrics(last_metrics, [metric])
```

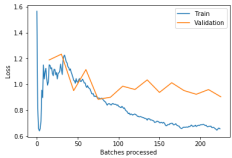
```
In [13]: # Create data bunch
np.random.seed(42)
modified = get_transforms(do_flip = True, flip_vert = False, max_rotate = 35, max_lighting = None, max_warp = .2, p_lighting = 0)
data = ImageDataBunch.from_df(':/home/jplineb/Chicken_Proj', df_Test_Train, label_col = 'sex', size = 224, bs = 2, valid_pct=0.25, ds_tfms = modified).normalize()
```

```
In [38]: learnerd14 = cnn_learner(data, models.resnet18, metrics=error_rate, wd=2)
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```
In [31]: learnerd14.fit_one_cycle(15)
learnerd14.recorder.plot_losses()
```

Total time: 00:25

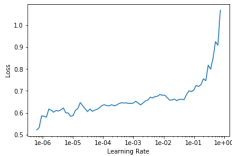
epoch	train_loss	valid_loss	error_rate	time
0	1.217916	1.188788	0.666667	00:01
1	1.156731	1.233827	0.666667	00:01
2	1.055543	0.951783	0.666667	00:01
3	1.011285	1.114406	0.888889	00:01
4	0.893995	0.884345	0.555556	00:01
5	0.849969	0.900749	0.555556	00:01
6	0.830081	0.986067	0.666667	00:01
7	0.769461	0.960470	0.777778	00:01
8	0.733247	1.034755	0.777778	00:01
9	0.712157	0.937880	0.777778	00:01
10	0.697115	1.012790	0.666667	00:01
11	0.667900	0.952279	0.666667	00:01
12	0.684452	0.923463	0.666667	00:01
13	0.672457	0.959909	0.666667	00:01
14	0.656455	0.904160	0.666667	00:01



```
In [32]: learnerd14.unfreeze()
learnerd14.lr_find()

LR Finder is complete, type {learner_name}.recorder.plot() to see the graph.
```

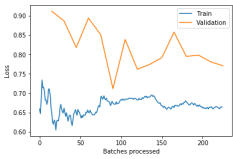
```
In [33]: learnerd14.recorder.plot()
```



```
In [34]: learner14.fit_one_cycle(15)
learner14.recorder.plot_losses()
```

Total time: 00:26

epoch	train_loss	valid_loss	error_rate	time
0	0.664947	0.912032	0.666667	00:01
1	0.648999	0.886862	0.666667	00:01
2	0.657448	0.817981	0.666667	00:01
3	0.656307	0.894110	0.666667	00:01
4	0.664362	0.851289	0.555556	00:01
5	0.678952	0.711710	0.555556	00:01
6	0.681345	0.838891	0.666667	00:01
7	0.683375	0.761733	0.666667	00:01
8	0.685244	0.774249	0.666667	00:01
9	0.688785	0.797756	0.666667	00:01
10	0.690553	0.857818	0.777778	00:01
11	0.679942	0.796983	0.666667	00:01
12	0.688766	0.796488	0.777778	00:01
13	0.683323	0.789608	0.777778	00:01
14	0.664047	0.771062	0.666667	00:01



```
In [ ]:
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