Deep Learning For Computer Vision - Final Challenge2
Group: DLCV08945

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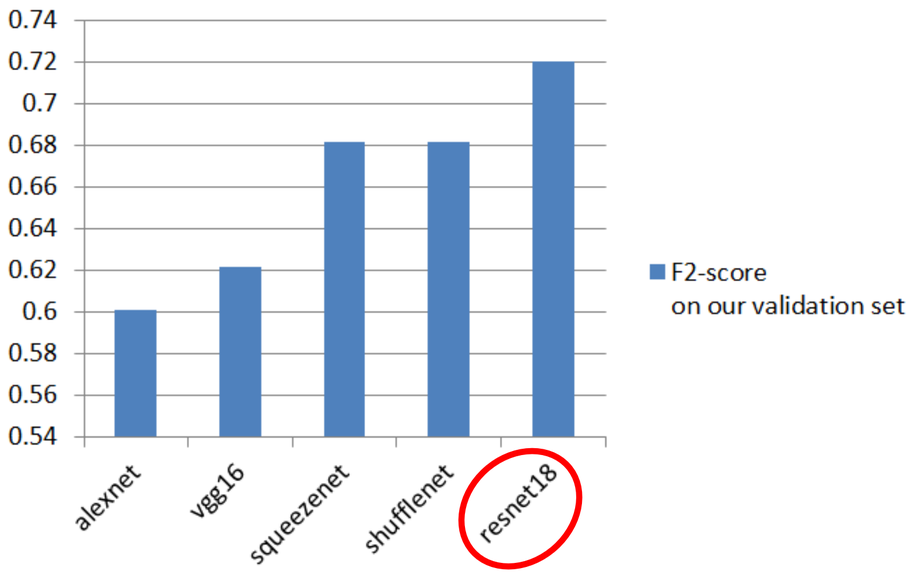
Method

We divide our method into 3 steps: **First**, we try to implement several famous model from Pytorch to overcome TA's baseline. For example:



We also try lots of data augmentation skill in torchvision.transforms. For example:

transforms.RandomHorizontalFlip()	transforms.RandomRotation ()
transforms.RandomAffine ()	transforms.AddGaussianNoise ()

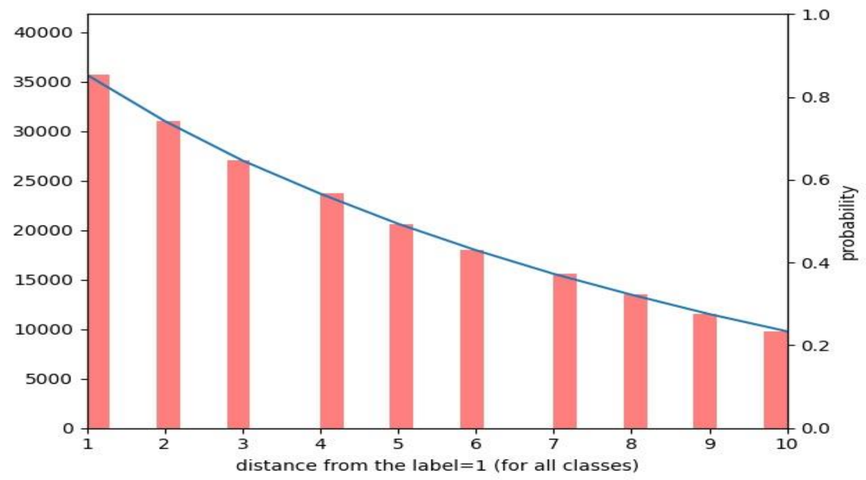
Second, We try to modify loss function BCEloss to deal with data imbalance problem. We use a very straight forward idea **"reweight positive loss"**

$$\mathrm{L} = \lambda L_{pos} + (1-\lambda) L_{neg}$$

Result	Sensitivity per class					P	R	F2
	Ich	Ivh	Sah	Sdh	Edh			
w/o	69.81	64.05	42.83	55.56	5.95	72.14	54.03	56.88
λ = 0.3	80.03	75.03	60.60	65.85	25.95	71.49	66.78	67.67
λ = 0.6	81.55	80.29	64.38	84.18	39.46	56.92	75.33	70.75
λ = 0.8	88.50	89.59	79.72	81.61	44.86	53.13	81.59	73.69

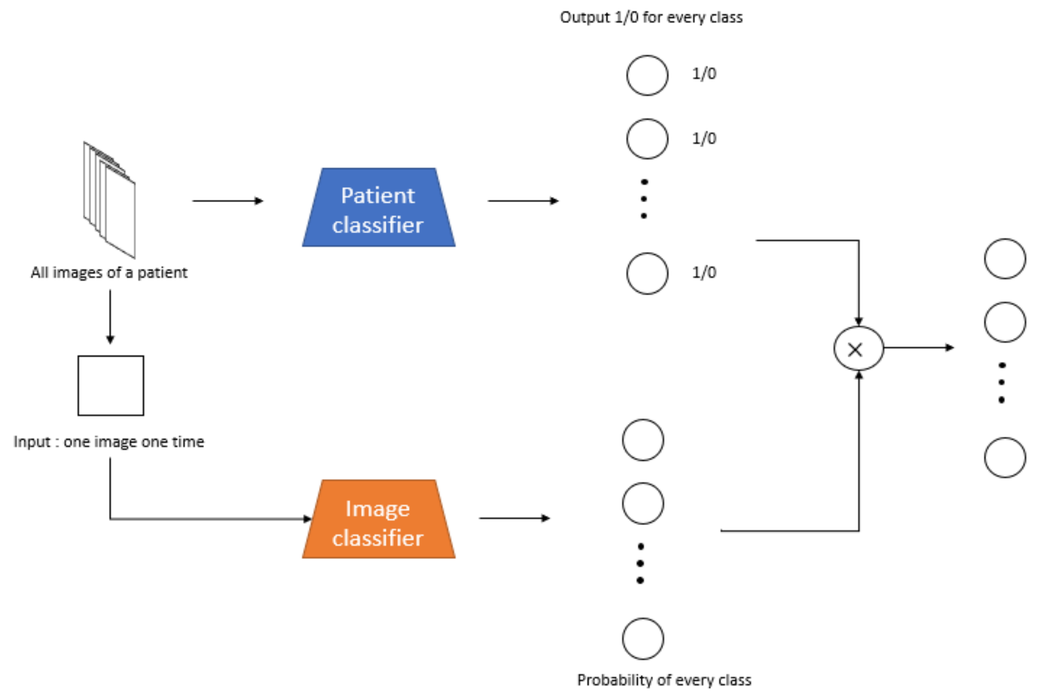
Resnet-18 with data augmentation

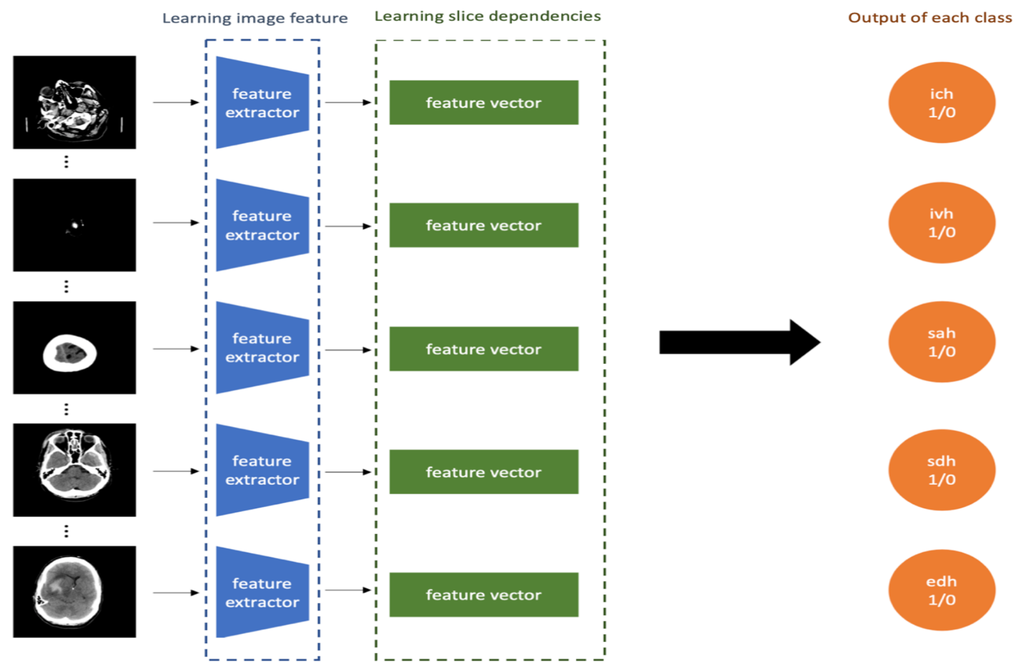
After reweight skill, we do post-processing with the sequential characteristic of the CT image dataset. We finally get F2=75.06.



In final step, we try three different strategies.

1. Two-stage output by adjusting the precision and recall based on previous best model.
2. CNN-GRU model (inspired by sequential data)
3. Ensemble skill-Bagging





	Two-stage output Adjusting precision and recall	CNN-GRU model	Ensemble Bagging
F2-score (kaggle)	0.757	0.68	0.735

Conclusion

There are two serious problems in medical images. First, uncommon diseases are difficult to collect enough data leading to dataset imbalanced. Second, recall is much more important than precision in medical image. To overcome these problems, we try several skills to train model.
Our findings: "Reweight on positive label", "Consider sequential characteristic" and "Ensenble" are helpful.