Исследование связи свойств сгенерированных медицинских изображений и характеристик входного случайного вектора

Подготовил
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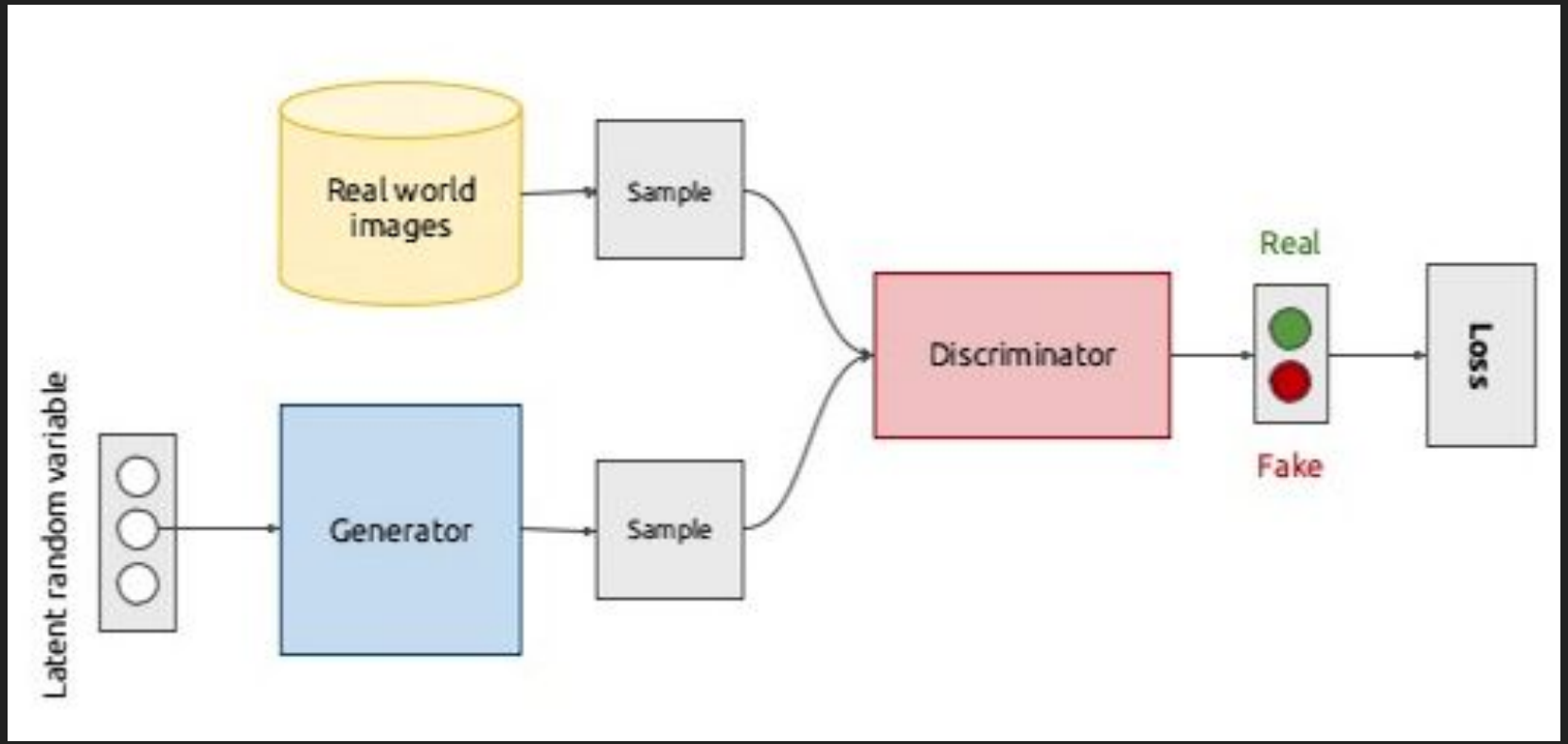
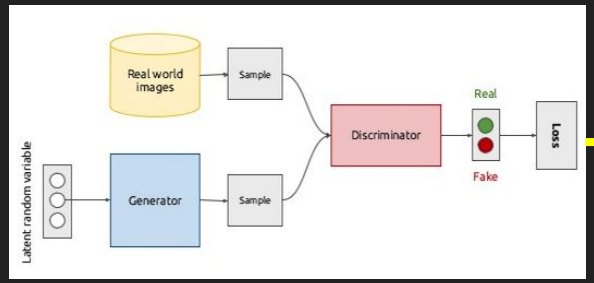
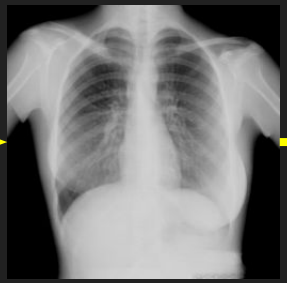
Generative Adversarial Network

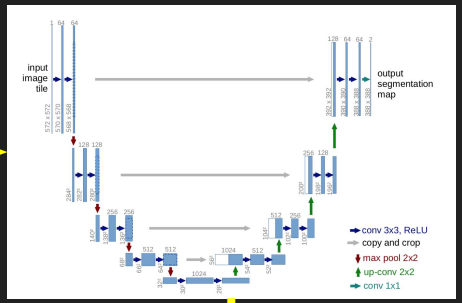


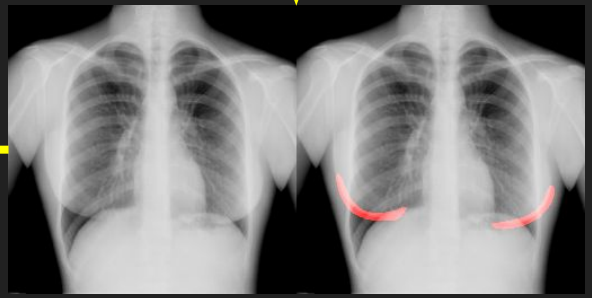
Generation examples

Pipeline





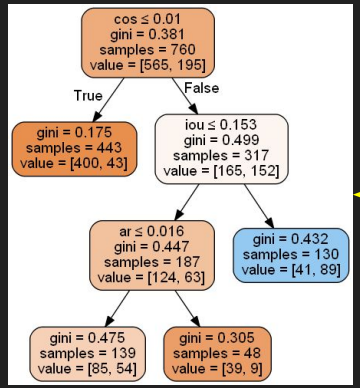




$$IoU = \frac{S_{left \cap right}}{S_{left \cup right}}$$

$$\cos = \frac{left \cdot right}{\|left\| \, \|right\|}$$

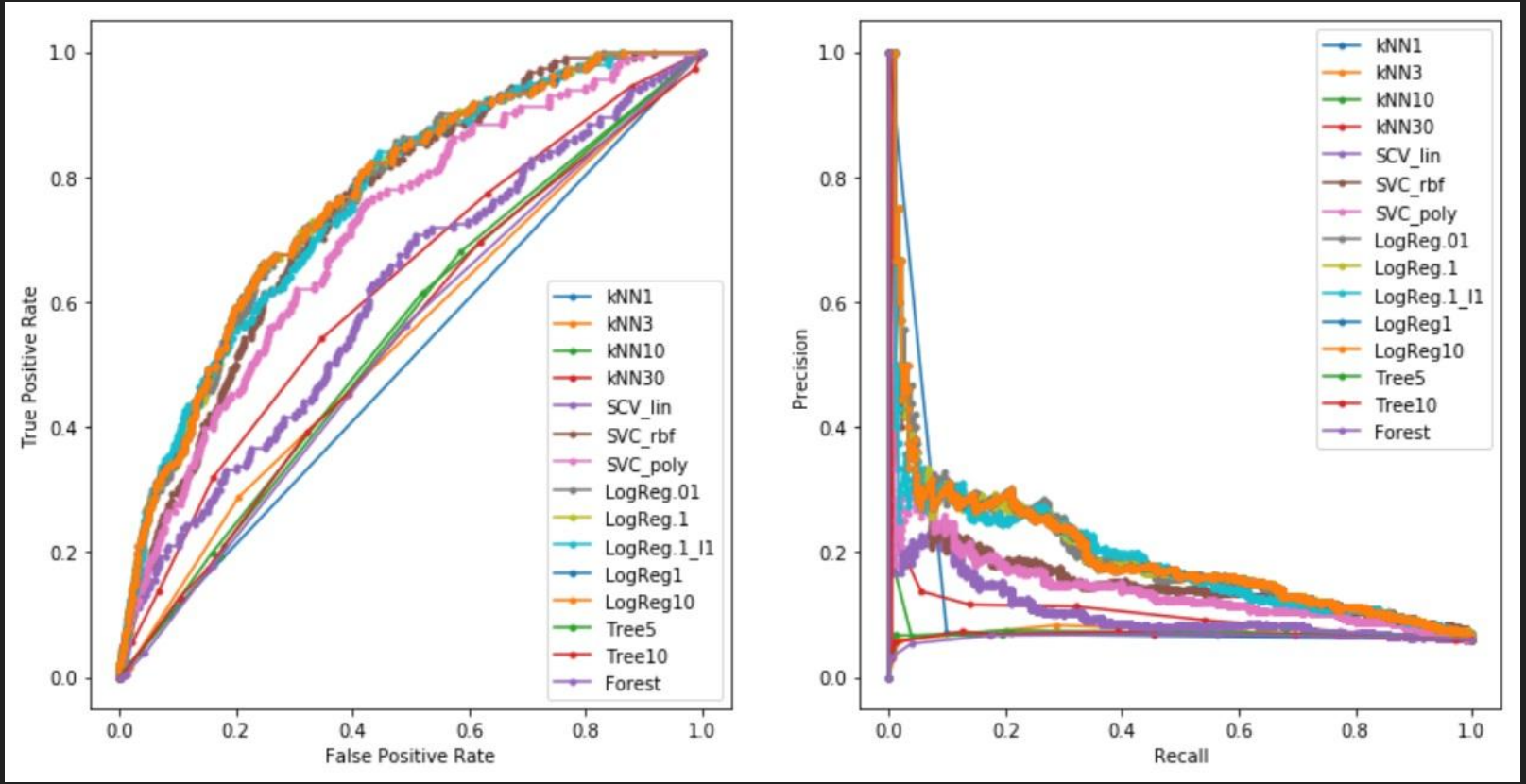
$$area\ ratio = \left(\frac{S_{left}}{S_{left} + S_{right}} - \frac{1}{2}\right)^2$$



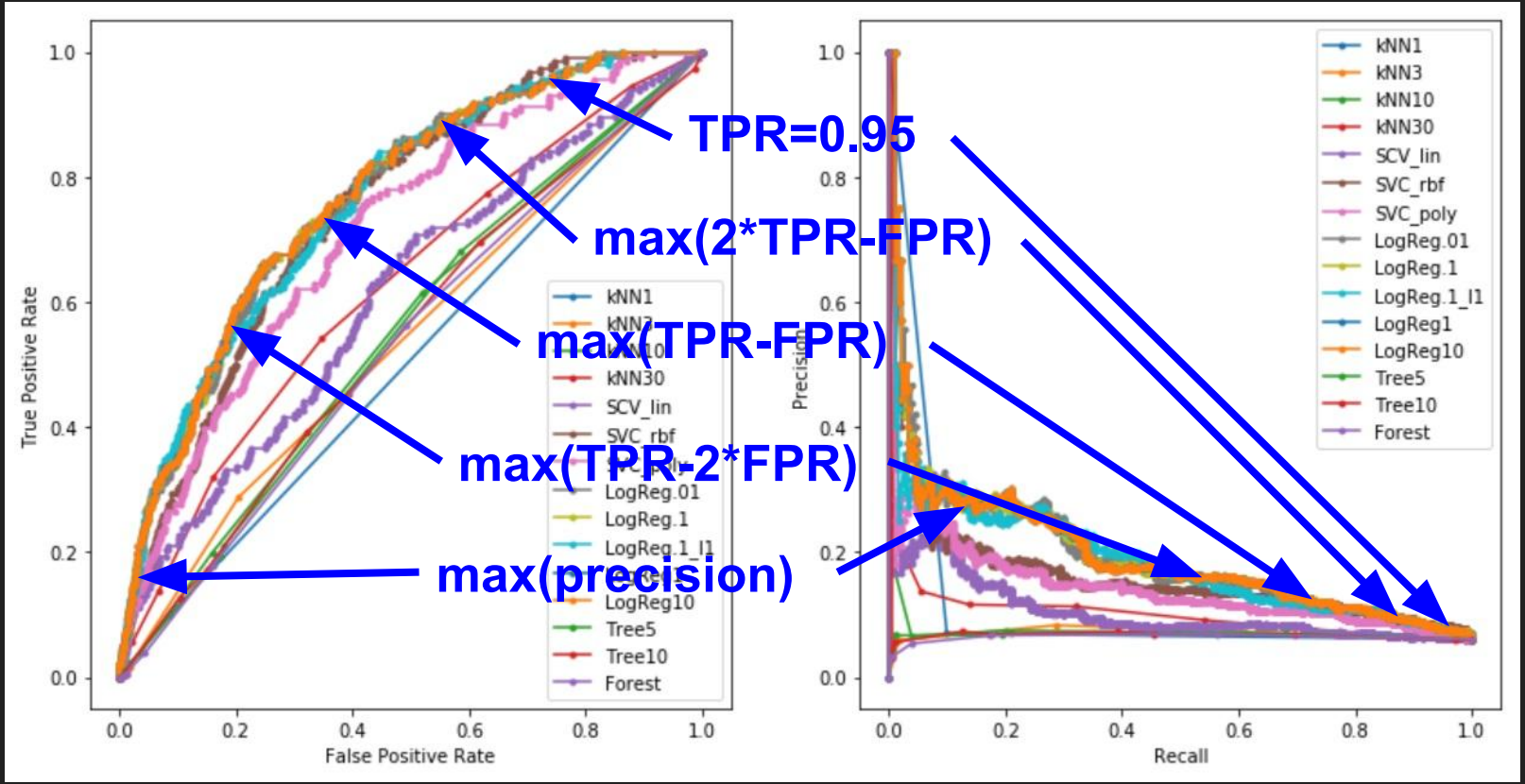
Data

group	valid	
18_24f	0	0.9397
	1	0.0603
18_24m	0	0.9306
	1	0.0694
38_44f	0	0.9637
	1	0.0363
38_44m	0	0.9678
	1	0.0322
58_64f	0	0.9589
	1	0.0411
58_64m	0	0.9794
	1	0.0206

Classification



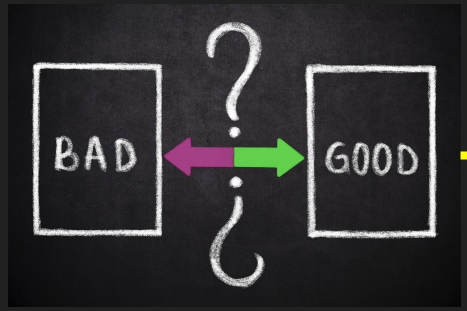
Thresholds

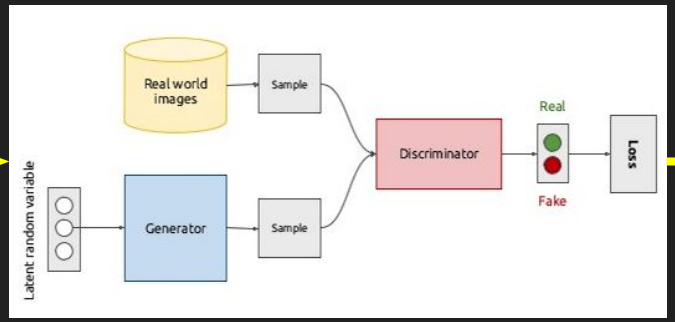

TPR=0.95
max(2*TPR-FPR)
max(TPR-FPR)
max(TPR-2*FPR)
max(precision)
True Positive Rate
False Positive Rate
Precision
Recall
kNN1
kNN3
kNN10
kNN30
SCV_lin
SVC_rbf
SVC_poly
LogReg.01
LogReg.1
LogReg.1_l1
LogReg1
LogReg10
Tree5
Tree10
Forest

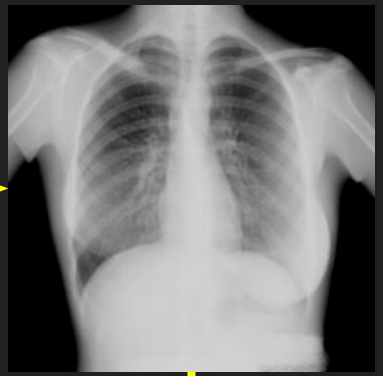
Thresholds

```
score: valid, group: 18_24m, threshold=argmax(tpr-fpr), valid
threshold: 0.05264174816025844
tpr: 0.7536231884057971
fpr: 0.4006514657980456
precision: 0.12351543942992874
init_precision: 0.0696969696969697
[[1656 1107]
 [  51  156]]

score: valid, group: 18_24m, threshold=argmax(tpr-fpr), test
threshold: 0.05264174816025844
tpr: 0.75
fpr: 0.4479166666666667
precision: 0.06521739130434782
init_precision: 0.04
[[53 43]
 [ 1  3]]

score: valid, group: 18_24m, threshold=argmax(2*tpr-fpr), valid
threshold: 0.02539035344676367
tpr: 0.9227053140096618
fpr: 0.6478465436120159
precision: 0.09641595153962645
init_precision: 0.0696969696969697
[[ 973 1790]
 [  16  191]]

score: valid, group: 18_24m, threshold=argmax(2*tpr-fpr), test
threshold: 0.02539035344676367
tpr: 1.0
fpr: 0.6666666666666666
precision: 0.058823529411764705
init_precision: 0.04
[[32 64]
 [ 0  4]]

score: valid, group: 18_24m, threshold=argmax(tpr-2*fpr), valid
threshold: 0.10663928188074857
tpr: 0.5072463768115942
fpr: 0.169019182048498
precision: 0.18356643356643357
init_precision: 0.0696969696969697
[[2296  467]
 [ 102  105]]

score: valid, group: 18_24m, threshold=argmax(tpr-2*fpr), test
threshold: 0.10663928188074857
tpr: 0.5
fpr: 0.14583333333333334
precision: 0.125
init_precision: 0.04
[[82 14]
 [ 2  2]]

score: valid, group: 18_24m, threshold=arg(tpr==0.95), valid
threshold: 0.019090226875107585
tpr: 0.9565217391304348
fpr: 0.7408613825551936
precision: 0.08819599109131403
init_precision: 0.0696969696969697
[[ 716 2047]
 [   9  198]]

score: valid, group: 18_24m, threshold=arg(tpr==0.95), test
threshold: 0.019090226875107585
tpr: 1.0
fpr: 0.75
precision: 0.05263157894736842
init_precision: 0.04
[[24 72]
 [ 0  4]]

score: valid, group: 18_24m, threshold=argmax(precision), valid
threshold: 0.27958700398479464
tpr: 0.12560386473429952
fpr: 0.026782482808541442
precision: 0.26
init_precision: 0.0696969696969697
[[2689   74]
 [ 181   26]]

score: valid, group: 18_24m, threshold=argmax(precision), test
threshold: 0.27958700398479464
tpr: 0.0
fpr: 0.03125
precision: 0.0
init_precision: 0.04
[[93  3]
 [ 4  0]]
```

Pipeline


BAD
GOOD


Real world images
Sample
Discriminator
Real
Loss
Fake
Latent random variable
Generator
Sample




What's Your Score?


GOOD
BAD