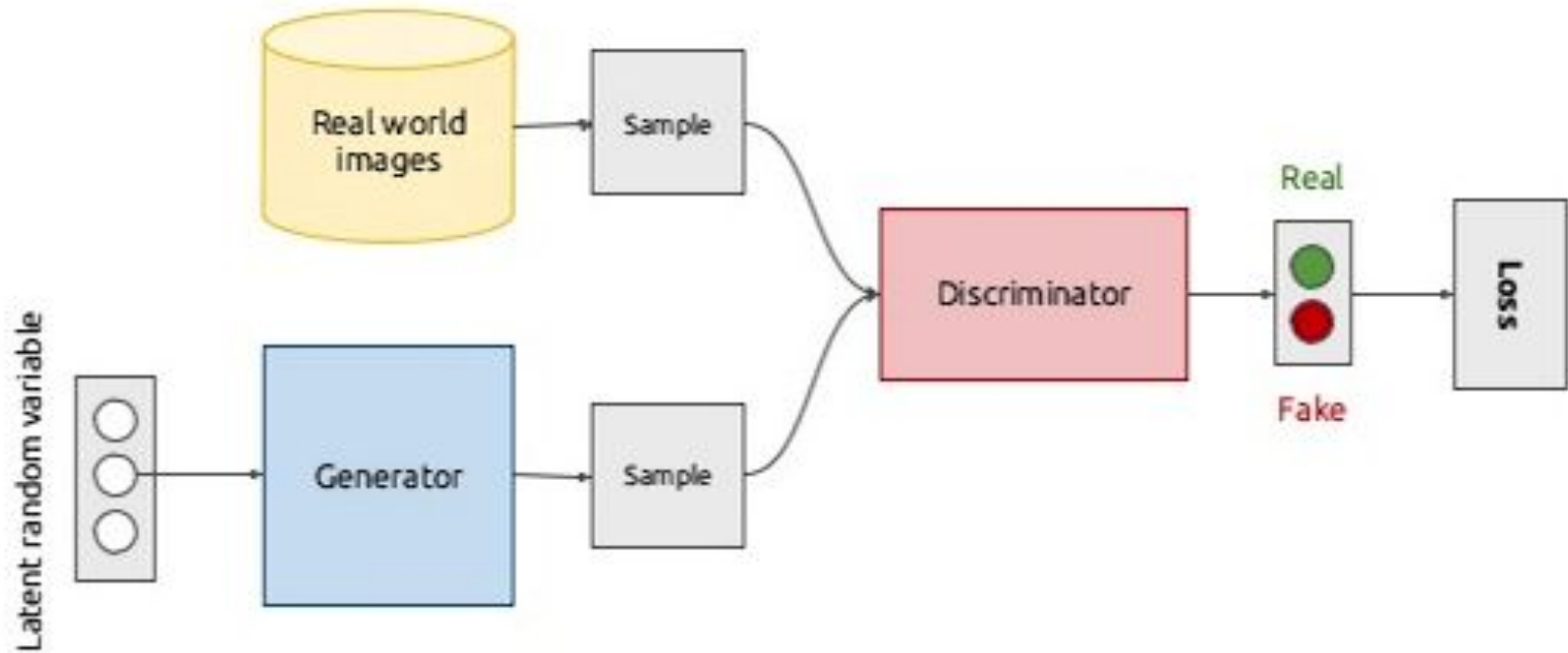


# Детектирование участков заданного типа на рентгеновских изображениях грудной клетки

Подготовил  
Студент 3 курса 3 группы  
Синявский Тимур Владимирович  
Научный руководитель  
Ковалёв В.А.

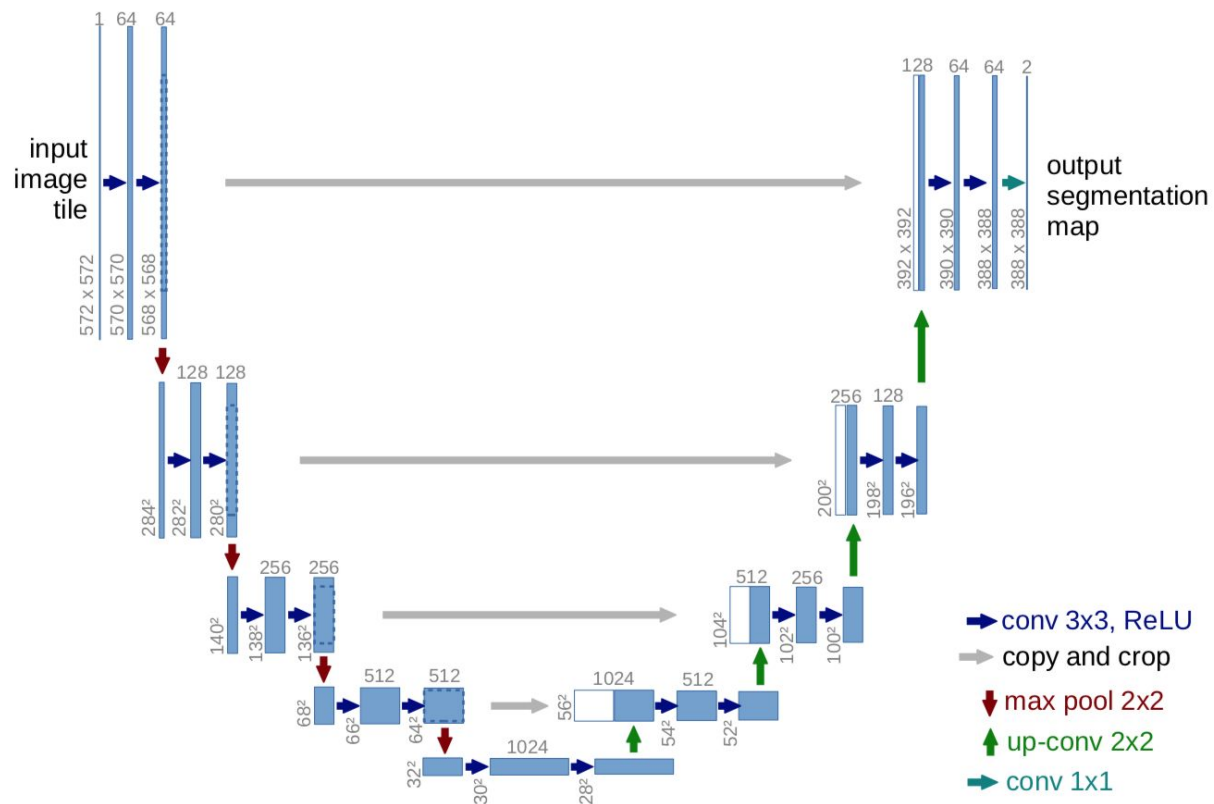
# Generative Adversarial Network



# Generation examples



# U-net



# Segmentation results



# Symmetry

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

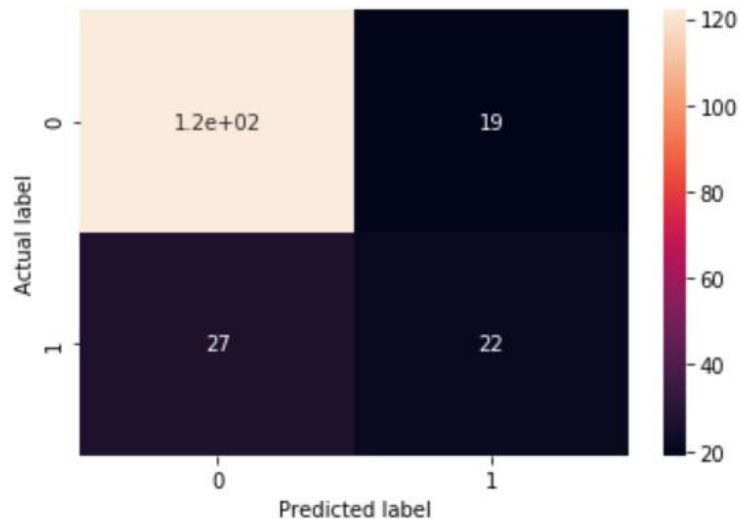
$$\cos = \frac{left \cdot right}{\|left\| \|right\|}$$

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

# Selection

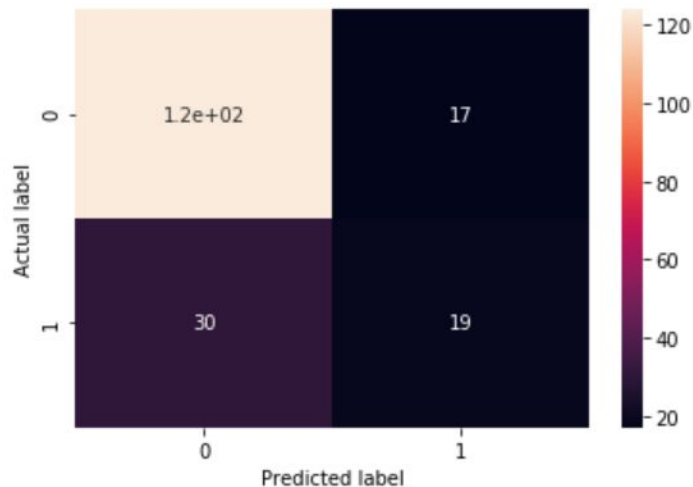
LogisticRegression - score\_train: 0.807, score\_test: 0.758

Test confusion matrix:

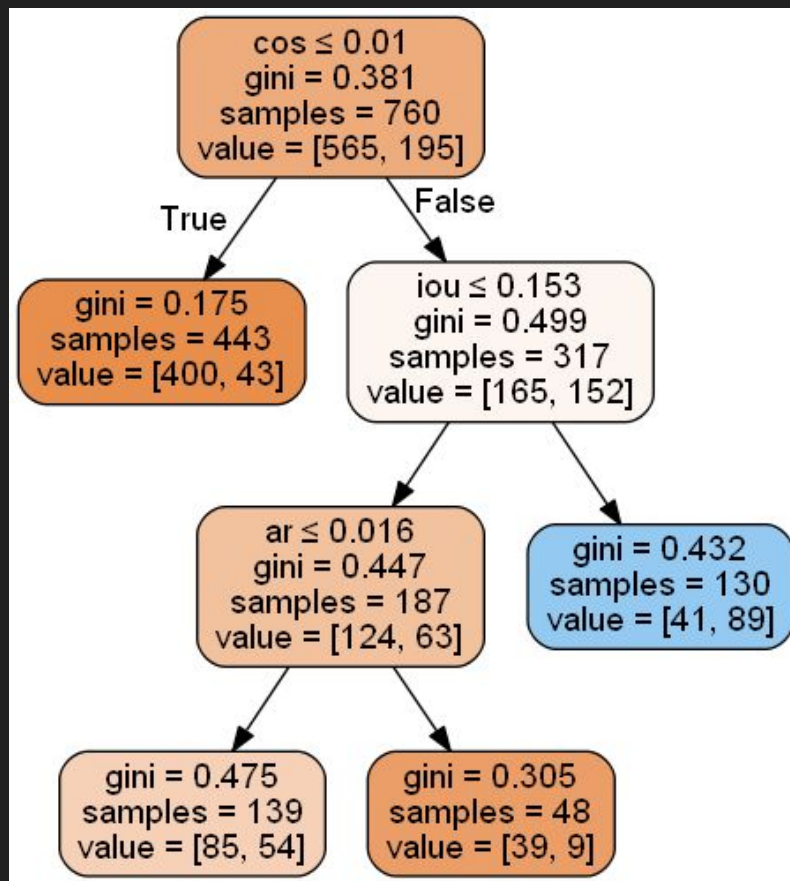


DecisionTreeClassifier - score\_train: 0.817, score\_test: 0.753

Test confusion matrix:

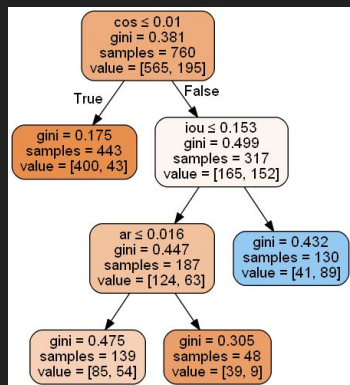
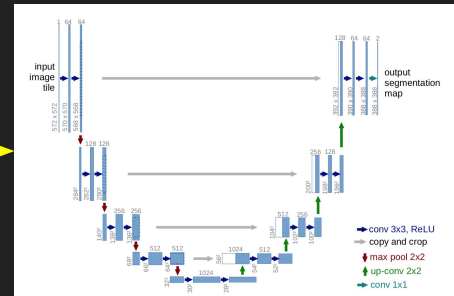
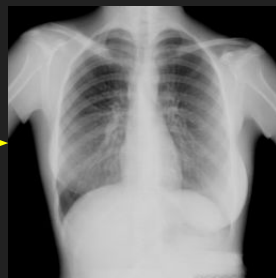
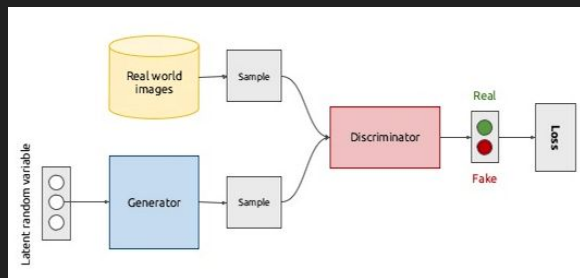


# Tree visualization





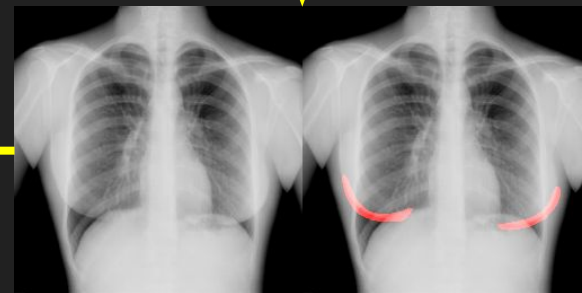
# Pipeline



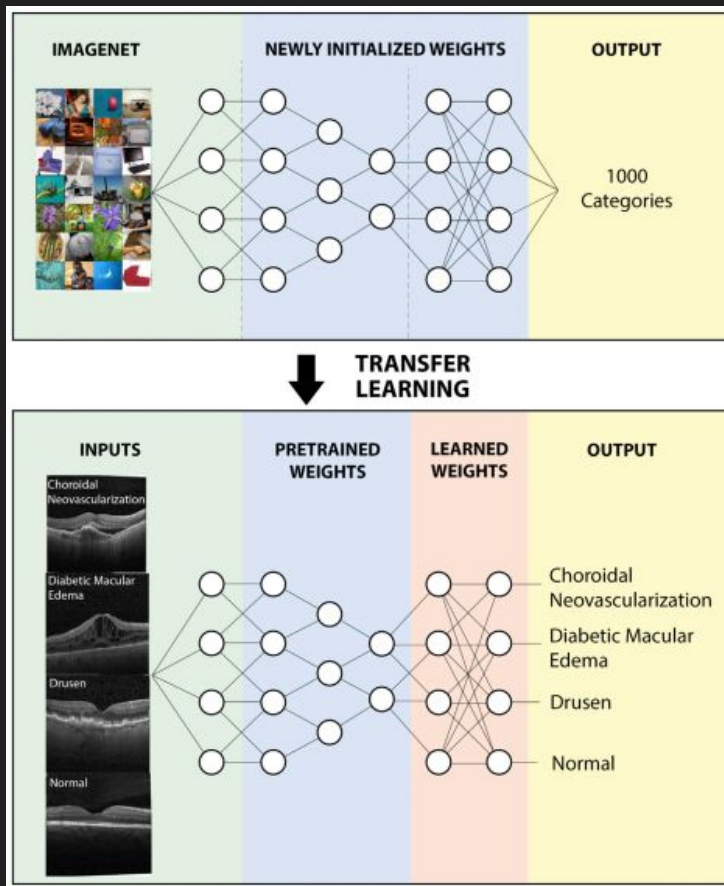
$$\text{IoU} = \frac{S_{\text{left}} \cap \text{right}}{S_{\text{left}} \cup \text{right}}$$

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

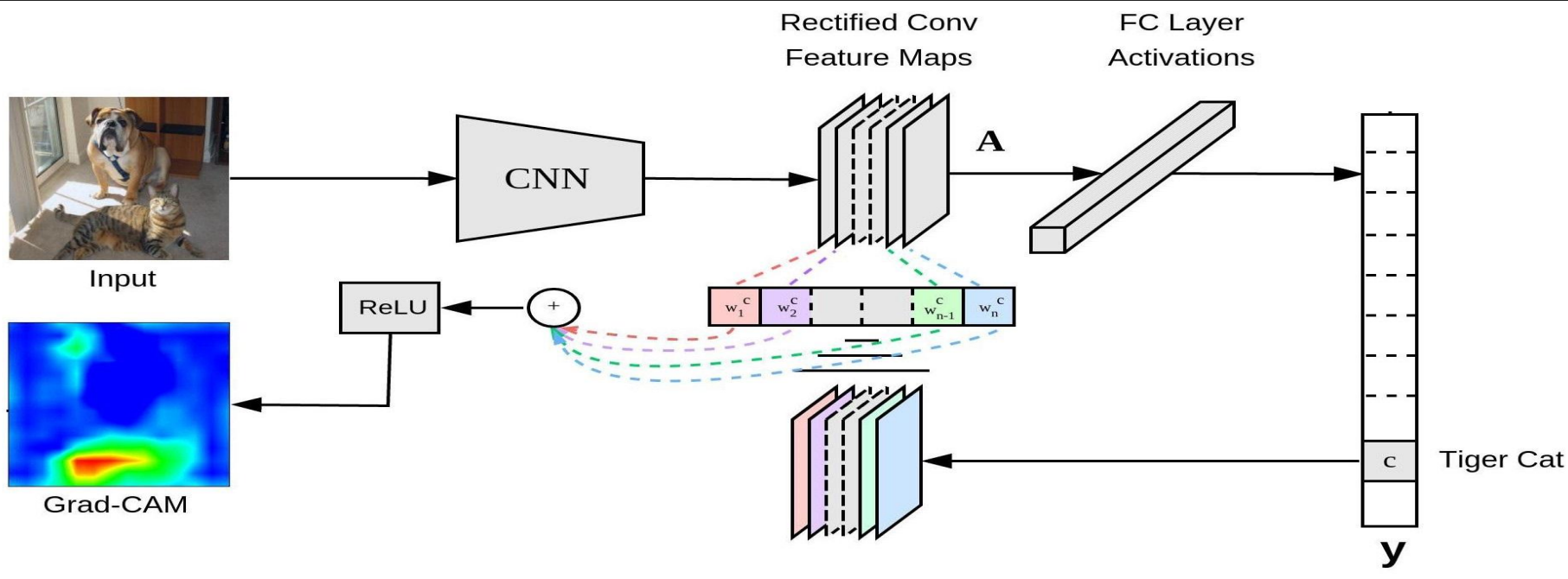
$$\text{area ratio} = \left( \frac{S_{\text{left}}}{S_{\text{left}} + S_{\text{right}}} - \frac{1}{2} \right)^2$$



# Transfer learning



# Grad-CAM



$$L_{\text{Grad-CAM}}^c = \text{ReLU} \left( \underbrace{\sum_k \alpha_k^c A^k}_{\text{linear combination}} \right)$$

$$\alpha_k^c = \overbrace{\frac{1}{Z} \sum_i \sum_j}^{\text{global average pooling}} \underbrace{\frac{\partial y^c}{\partial A_{ij}^k}}_{\text{gradients via backprop}}$$

# Grad-CAM results

