Идентификация Китов по Изображениям

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Команда 💪

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Researcher at HD Uni

Павел Плесков

DS at Point API

In the money | Gold | Silver | Bronze

#	△pub	Team Name	Kernel	Team Members	Score
1	—	Earhian|Venn|Tom|A.L.@KAIL			0.97309
2	▲1	WhaleTao			0.97208
3	▼1	pudae			0.97113
4	▲1	David			0.96783
5	▼1	ZFTurbo & Weimin			0.96781
6	—	bestfitting			0.96635
7	▲1	Pure Magic thanks radek			0.96470
8	▼1	S&P Global Alternative Data			0.96299
9	▲2	[ods.ai] BratanNet			0.95981
10	▼1	Sanakoyeu, Pleskov, Shakhray			0.95946
11	▲1	Nestlogic			0.95934
12	▲1	TerenceLiu			0.95878
13	▲2	Scarfluke 🐋			0.95652
14	—	NPU-ASGO			0.95597

Постановка задачи

- Идентификация среди 5004 классов, либо «new_whale»

?

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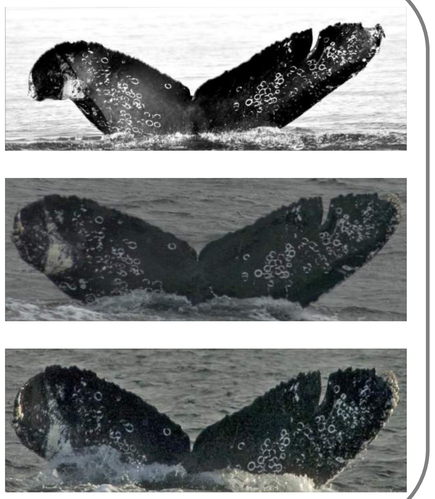

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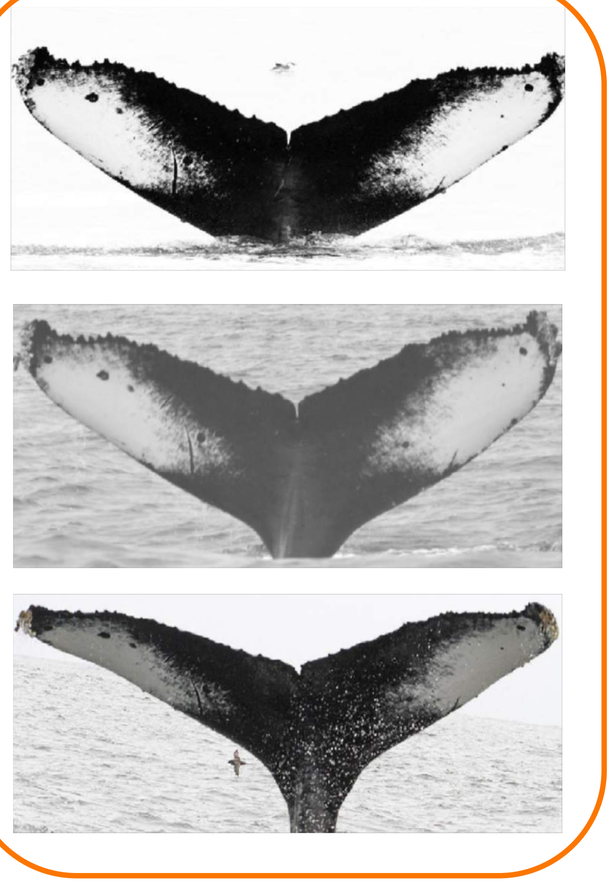

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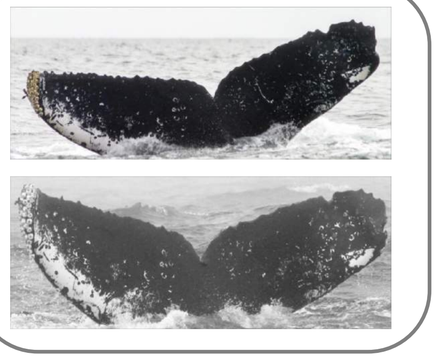

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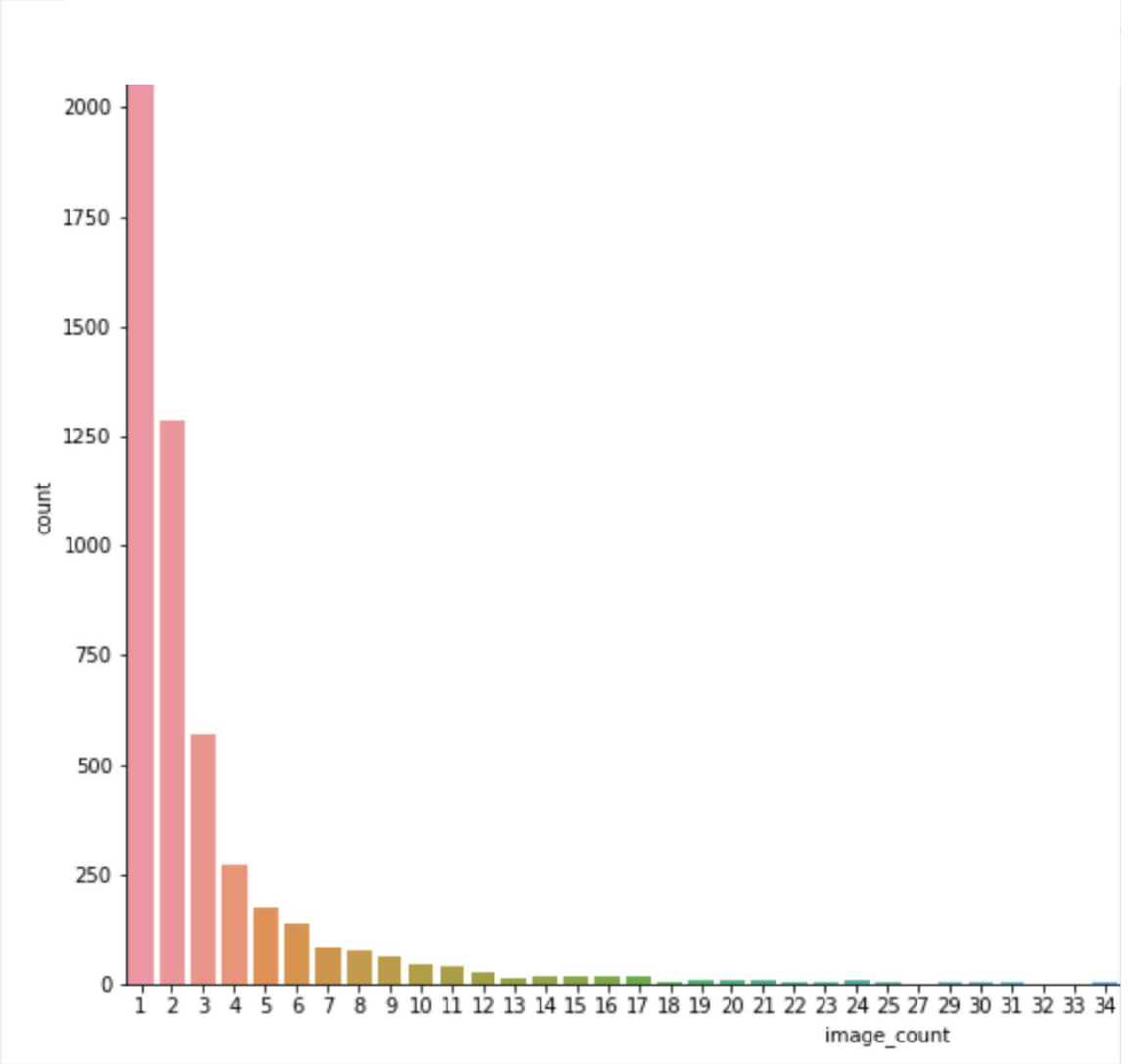
Особенности задачи

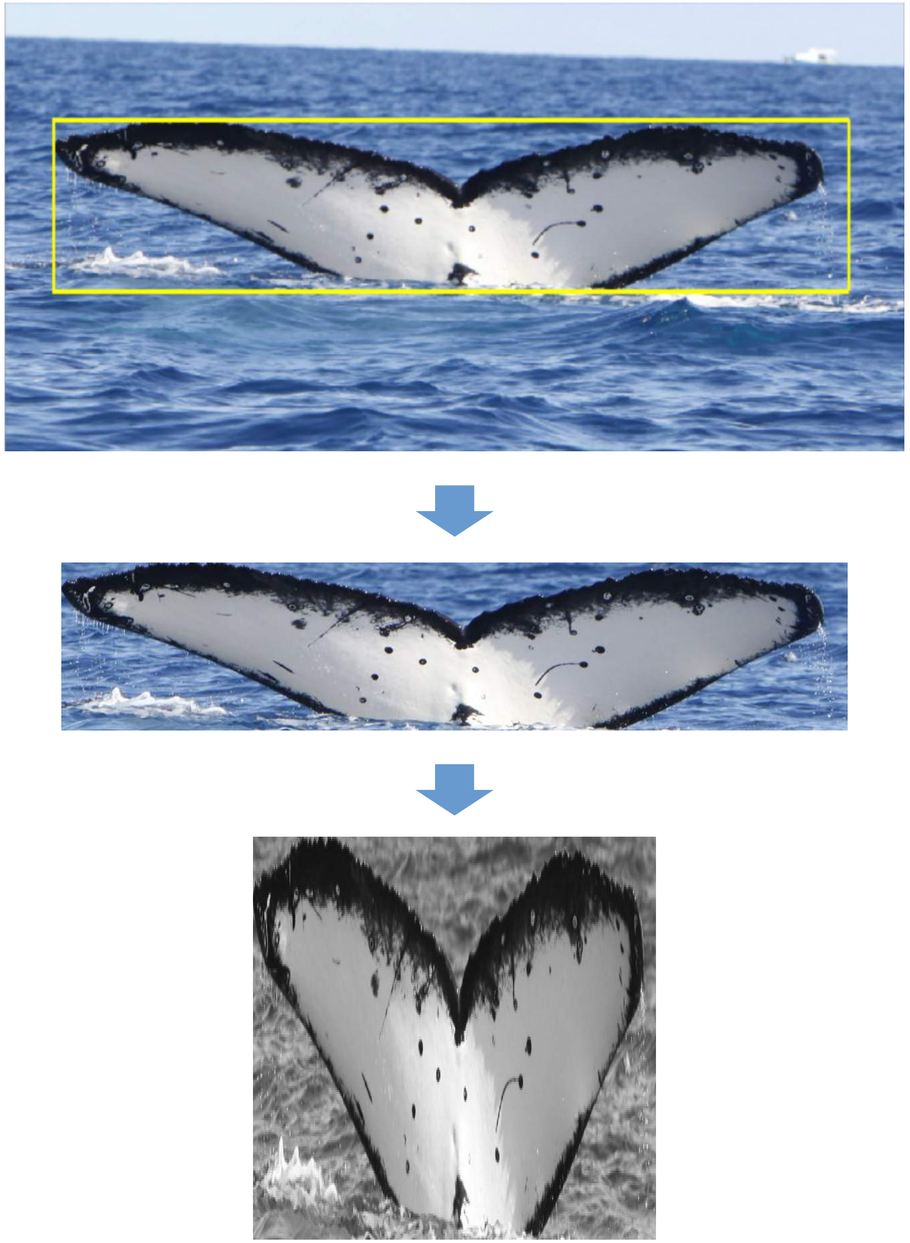
- Метрика: mAP@5
- Несбалансированная выборка
- Наличие класса «new_whale»
- Public/Private: 20% / 80%
- Ошибки в разметке/шум



Наше решение

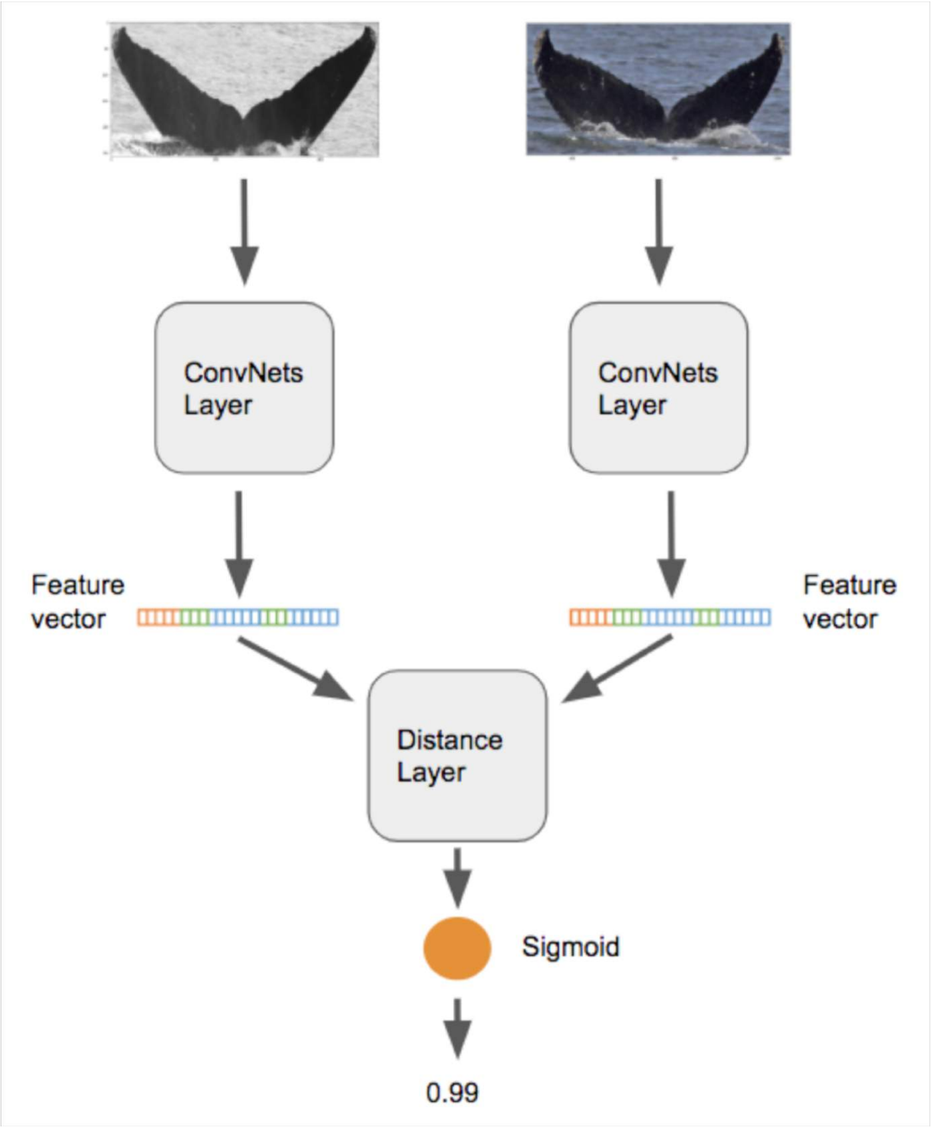
Валидация и препроцессинг

- Валидация из Playground (2221 семпл)
- Удалили new_whale из трейна
- Bounding boxes model (public kernel)
- Привели в ч/б формат
- Квадратные изображение

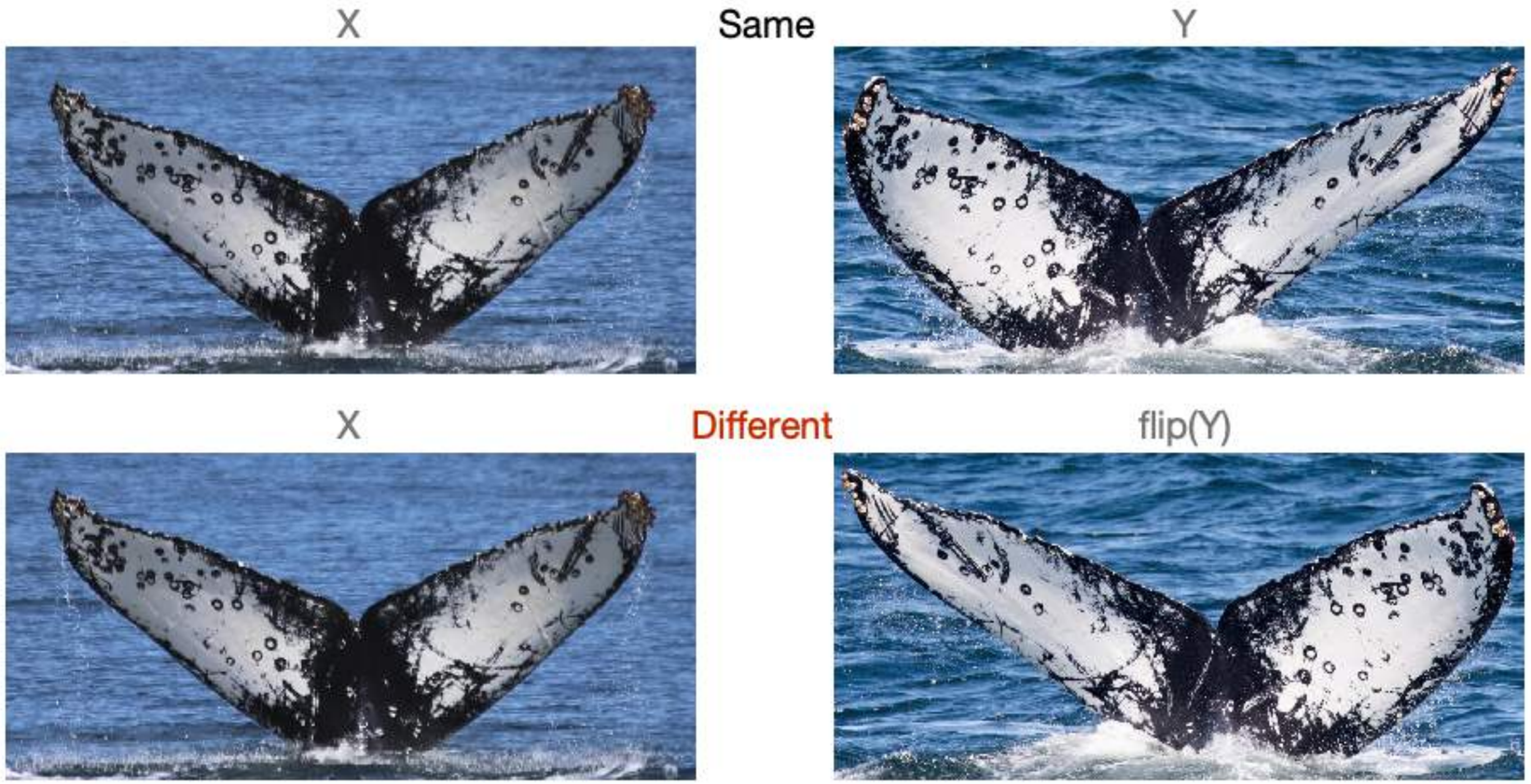


Siamese Nets

- **Backbones:**
- ResNet-18, ResNet-34, ResNet-50
- SE-ResNeXt-50 (**LB 0.929**)
- Hard-negative, hard-positive mining
- Progressive learning (299->384)
- Adam, reduce 5 times on plateau
- Batch size: 64
- TTA



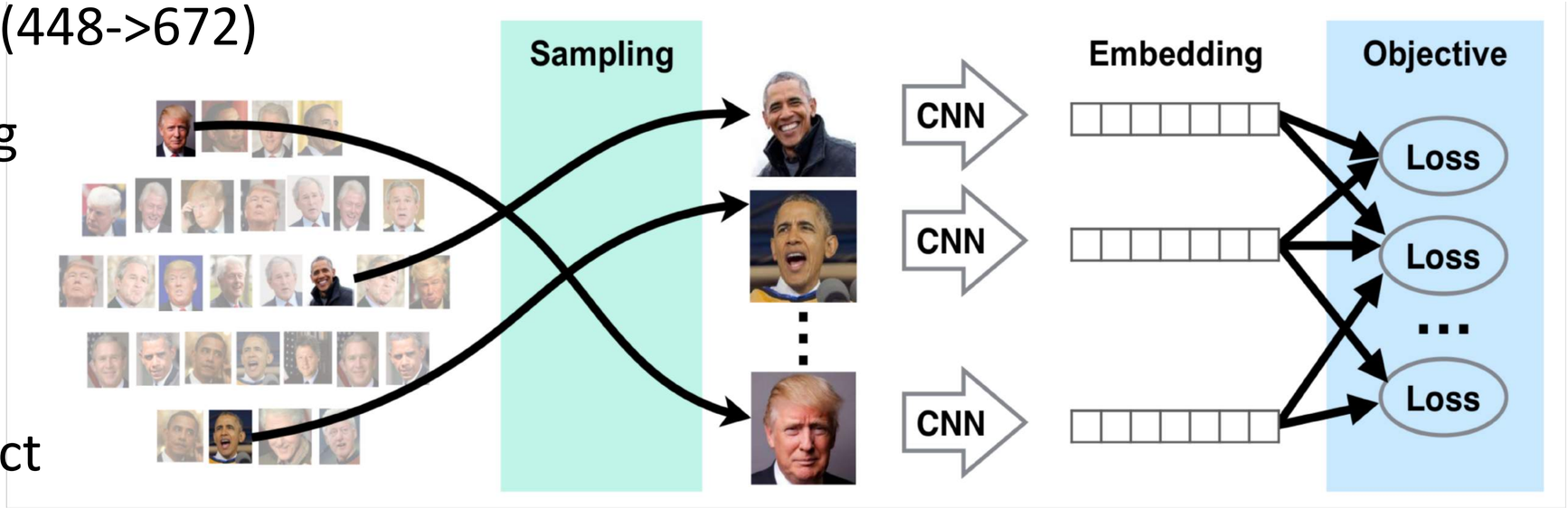
Siamese Nets: Augmentations



- **Smart flipping strategy**
- Gaussian noise, blur, brightness, contrast

Metric Learning

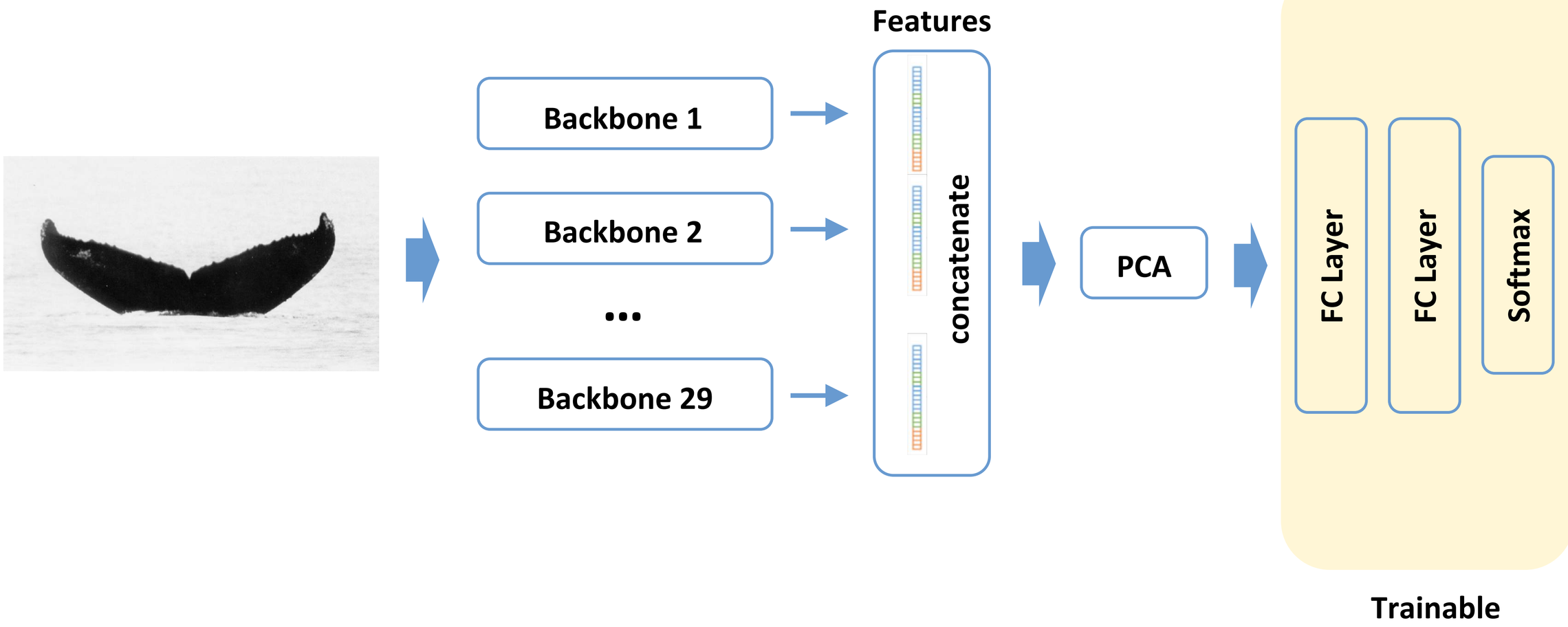
- Margin based loss arxiv.org/abs/1706.07567
- ResNet (50, 101, 152), DenseNet (121, 169)
- Best single DenseNet-169: **LB 0.931**
- Progressive learning (448->672)
- Hard-negative mining
- Adam, batch size 96
- Flip everything
- Inference: dot product



*"**Divide and Conquer the Embedding Space for Metric Learning**", Artsiom Sanakoyeu, Vadim Tschernezki, Uta Büchler, Björn Ommer, In CVPR 2019*

Classification on Features

› 0.924 LB



Определение новых китов

3 лучшие модели

TOP-4

TOP-4

TOP-4

Все модели

Features

0.993
0.949
0.399
0.774
...
0.602
0.776
0.822
0.473

Размеры картинки

1280
720

new_whale?

LightGBM
kNN
LogReg
SVM

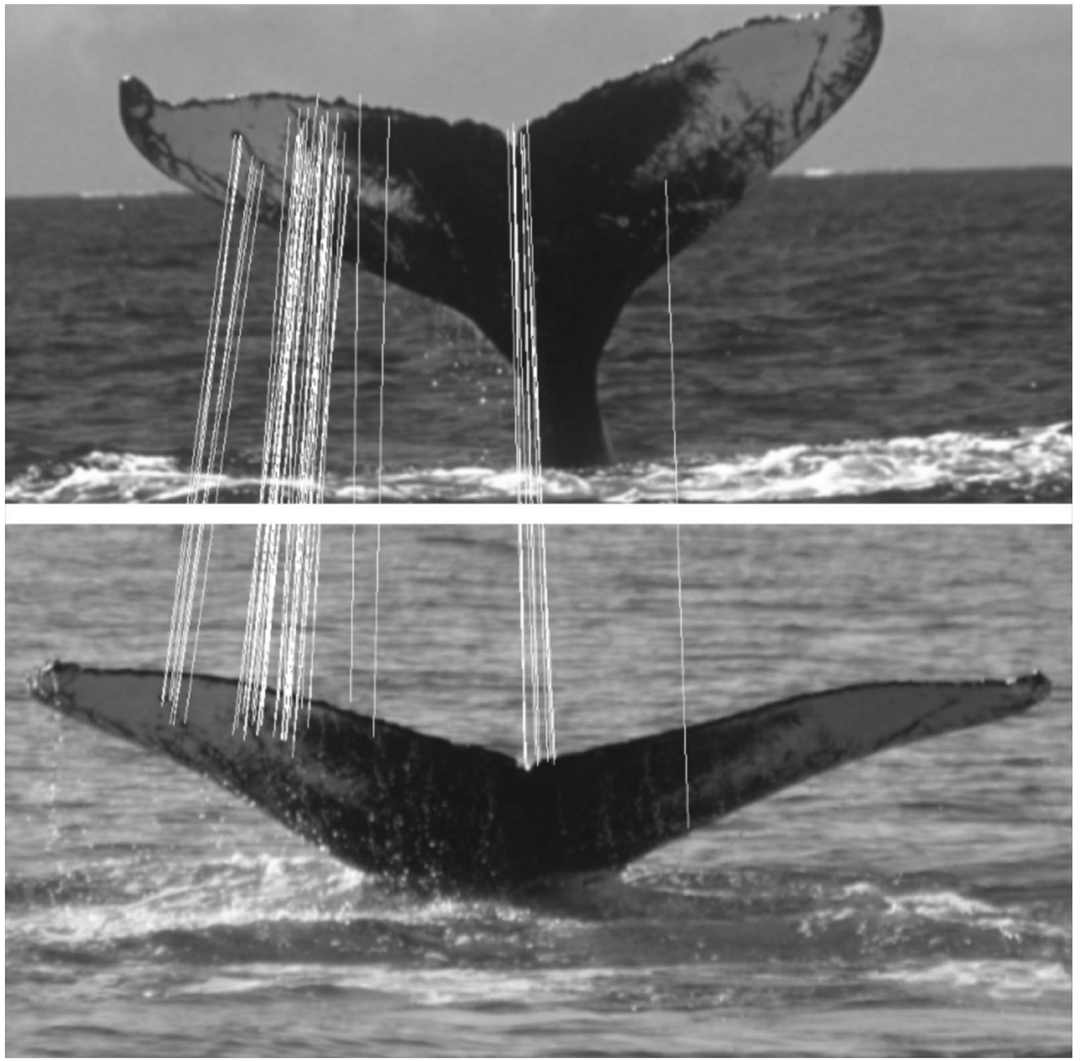
Remarks

- The backbones were ImageNet-pretrained
- Pseudo-labelling helped
- Background crops were useless

Подходы других команд

Keypoint Matching (David, 4th Place)

- Full-resolution images
- SIFT / ROOTSIFT for keypoint extraction
- FAISS for keypoint matching
- Filtering (LMedS -> RANSAC)
- Thresholding by # of matches
- U-Net for background detection



Other

Classification + Metric Learning (“Pure Magic thanks Radek”, 7th Place)

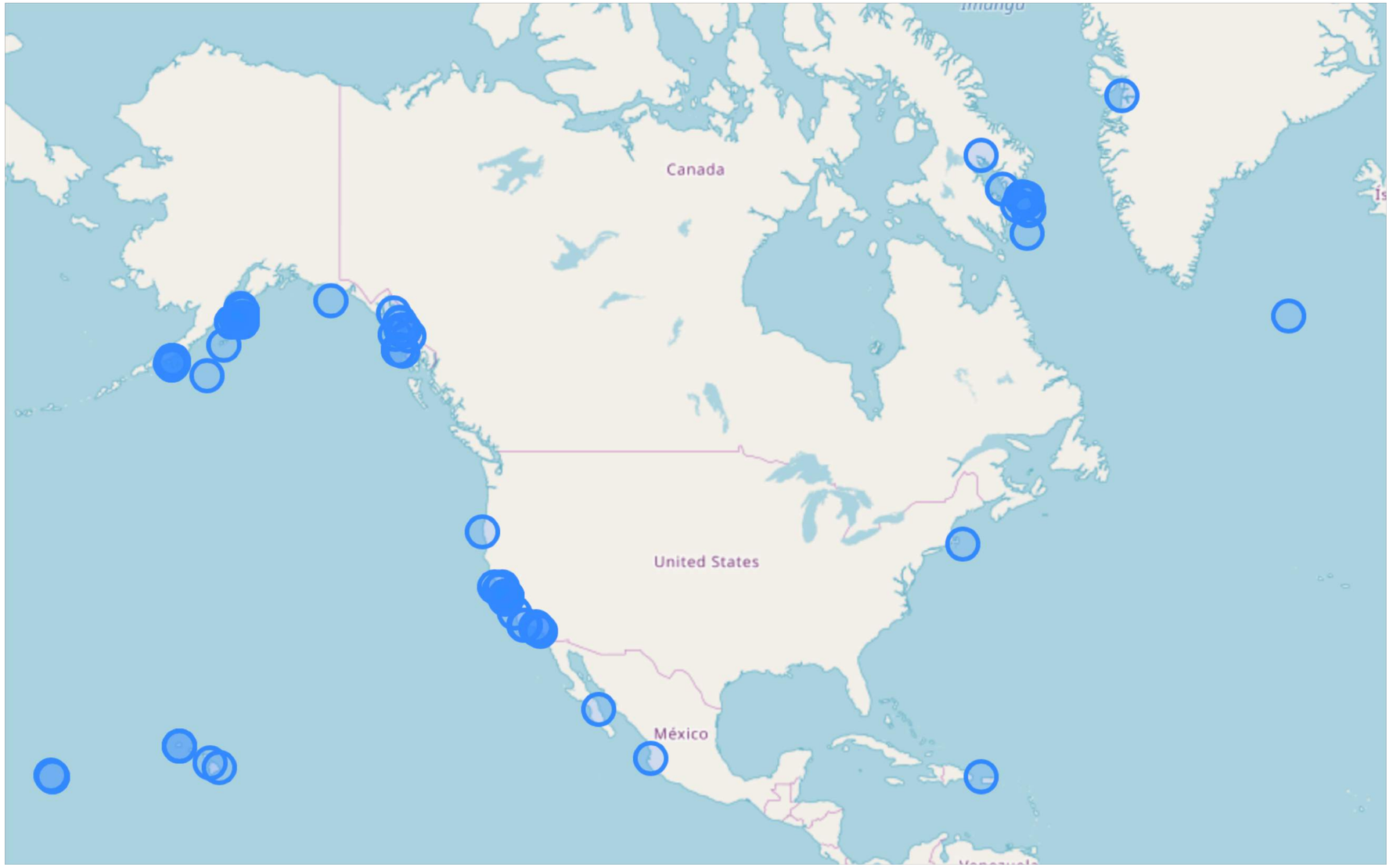
- Ring loss
- Temperature scaling
- Triplet loss

Face Recognition Approaches (“BratanNet”, 9th Place)

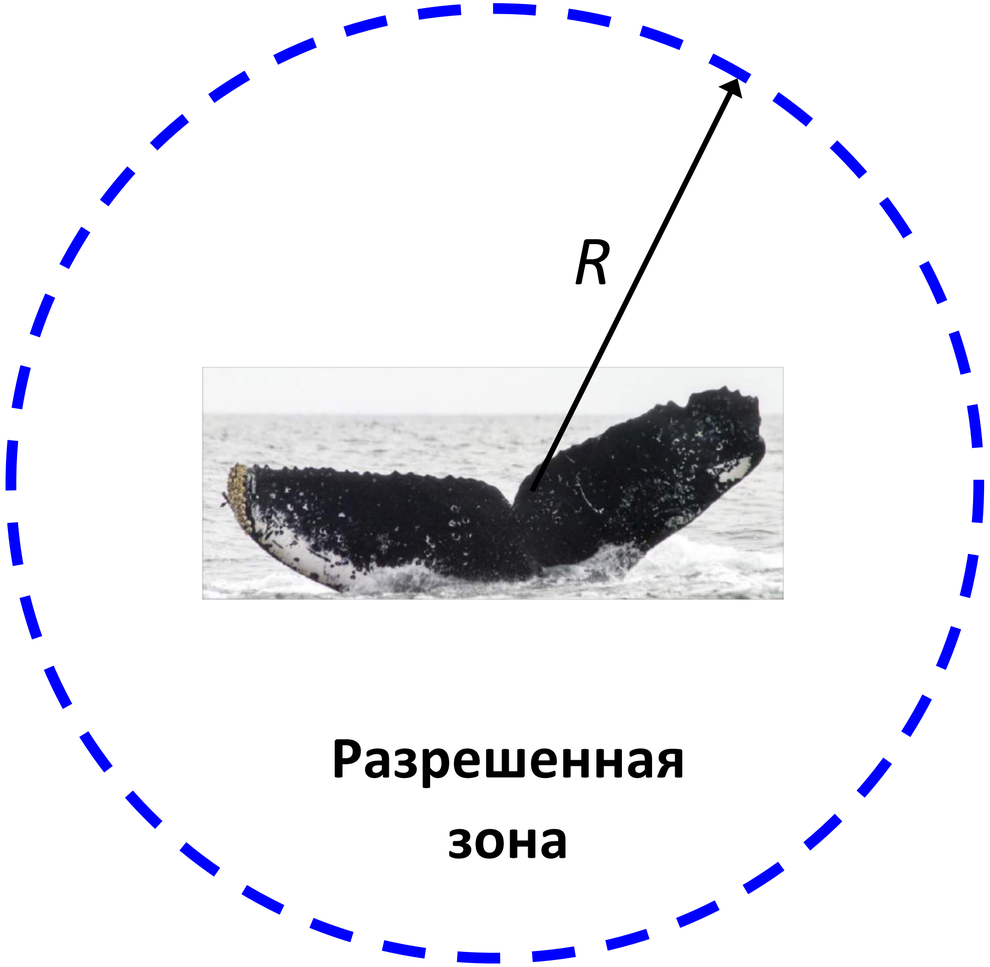
- CosFace
- ArcFace
- CoordConv, GapNet

#JustForFun

Метаданные: GPS Leak (+0.000 LB)



Метаданные: GPS Leak (+0.000 LB)



Спасибо за внимание!

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