**Kaggle Winners and References related to their work**

1st Place - [Post](https://www.kaggle.com/c/humpback-whale-identification/discussion/82366)

* Github [repo](https://github.com/earhian/Humpback-Whale-Identification-1st-)
* Model base: senet154 ([paper](https://arxiv.org/pdf/1709.01507.pdf))
* Losses: Triplet ([paper](https://arxiv.org/pdf/1412.6622v4.pdf)) (for embedding) + BCE ([guide](https://towardsdatascience.com/understanding-binary-cross-entropy-log-loss-a-visual-explanation-a3ac6025181a)) (for final classification and allow new whales)
* Data preparation: pseudo-labelling ([paper](https://www.kaggle.com/blobs/download/forum-message-attachment-files/746/pseudo_label_final.pdf)) (data snooping?), horizontal image flips, mask inputs (bounding boxes?)
* Training: training phases: 1. with all ids with >10 samples (helps converge faster/easier) & 2.with all samples and fixed all but last 2 layers, sigmoid per class
* Inference: results of sigmoids (used for BCE) allow confidence per class and "new\_whale" class (but does not give new whales separate ids)
* Other tips/tricks/enhancements: predicted class balancing ("correcting" prediction "mistakes")

2nd Place - [Post](https://www.kaggle.com/c/humpback-whale-identification/discussion/83885)

* Github [repo](https://github.com/SeuTao/Humpback-Whale-Identification-Challenge-2019_2nd_palce_solution)
* Model base: resnet101 (resnet [paper](http://openaccess.thecvf.com/content_cvpr_2016/papers/He_Deep_Residual_Learning_CVPR_2016_paper.pdf)), seresnet101 (github [repo](https://github.com/hujie-frank/SENet)), seresnext101 (resnext [paper](https://arxiv.org/pdf/1611.05431.pdf))
* Losses: Triplet ([paper](https://arxiv.org/pdf/1412.6622v4.pdf)) + Arcface ([paper](https://arxiv.org/pdf/1801.07698.pdf)) (like triplet but uses cluster centers instead as positive/negative) + Focal ([paper](https://arxiv.org/pdf/1708.02002.pdf)) (increases penalty for incorrect classifications and lowers for correct)
* Data preparation: pseudo-labelling ([paper](https://www.kaggle.com/blobs/download/forum-message-attachment-files/746/pseudo_label_final.pdf)) (data snooping?) after reaching 0.94, horizontal image flips, other data augmentation
* Training: adam with "warm up lr strategy", used bottleneck feature of arcface model (resnet) for embeddings (and cosine similarity prob?) (how does training work?.. since there is no "true" embedding)
* Inference: uses cosine similarity ([guide](http://blog.christianperone.com/2013/09/machine-learning-cosine-similarity-for-vector-space-models-part-iii/)) of embeddings between train and test features
* Other tips/tricks/enhancements: 3 model backbones, class-balanced loss ([paper](https://arxiv.org/pdf/1901.05555.pdf)) (helps with classes with low # of samples) (maybe used for all loses..), 10 model ensemble, (thinks results might be better if used 0.97 model to find pseudo-labels)
* Author note: "margin based softmax loss is the key ..., removing triplet loss has no harm on the final score" (margin based softmax

3rd Place - [Post](https://www.kaggle.com/c/humpback-whale-identification/discussion/82484#latest-502552)

* Github [repo](https://github.com/pudae/kaggle-humpback)
* Model base: densenet121 ([paper](https://arxiv.org/pdf/1608.06993.pdf))
* Losses: Arcface ([paper](https://arxiv.org/pdf/1801.07698.pdf))
* Data preparation: horizontal image flips, other data augmentation, no new\_whales in training
* Training: adam, lr specified, arcface approach for embedding, center of 5 feature vectors (from bbs) as embedding, uses cosine similarity of image center to other image centers (prob used a threshold here..?)
* Inference: same as training except uses cosine similarity of test image center to individuals' centers, 0.276 threshold for new\_whale (picked from validation)
* Other tips/tricks/enhancements: 5 models trained with human-annotated fluke bounding boxes & landmarks used, some predicted class duplicate identification (not sure what is going on here?)

Some of the points I make above have question marks because I am either not sure whether my opinion about the matter is true or I am confused about how that step/method works. It would be great if we could talk about these points next meeting maybe or some other time.