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Which whale is it, anyway?

Face recognition for right whales using deep learning

Robert Bogucki & Maciek Klimek

The challenge

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Kaggle competition

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#	Δrank	Team Name ‡ model uploaded * in the money	Score	Entries	Last Submission UTC (Best – Last Submission)
1	–	**deepsense.io ‡ ***	**0.59600**	**110**	**Thu, 07 Jan 2016 23:58:03 (-0.2h)**
2	–	felixlaumon ‡ *	1.07585	35	Thu, 07 Jan 2016 14:11:52 (-1.6h)
3	–	SKE ‡ *	1.14982	100	Thu, 07 Jan 2016 23:51:28 (-0.2h)
4	–	threedB	1.33648	37	Thu, 07 Jan 2016 23:46:31
5	–	AbdulWahab	1.46909	7	Thu, 07 Jan 2016 23:42:40
6	–	Tsakalis Kostas	1.51900	60	Thu, 07 Jan 2016 22:52:43 (-11h)
7	–	bawdyb .	1.55823	49	Thu, 07 Jan 2016 23:30:34 (-23.8h)
8	–	Left Whales	1.75764	32	Thu, 07 Jan 2016 23:54:35 (-0h)
9	–	Anil Thomas	1.80178	19	Thu, 07 Jan 2016 06:10:13 (-38.3h)
10	–	Doug Koch	2.13797	85	Thu, 07 Jan 2016 21:09:17 (-9h)

The true face of a right whale

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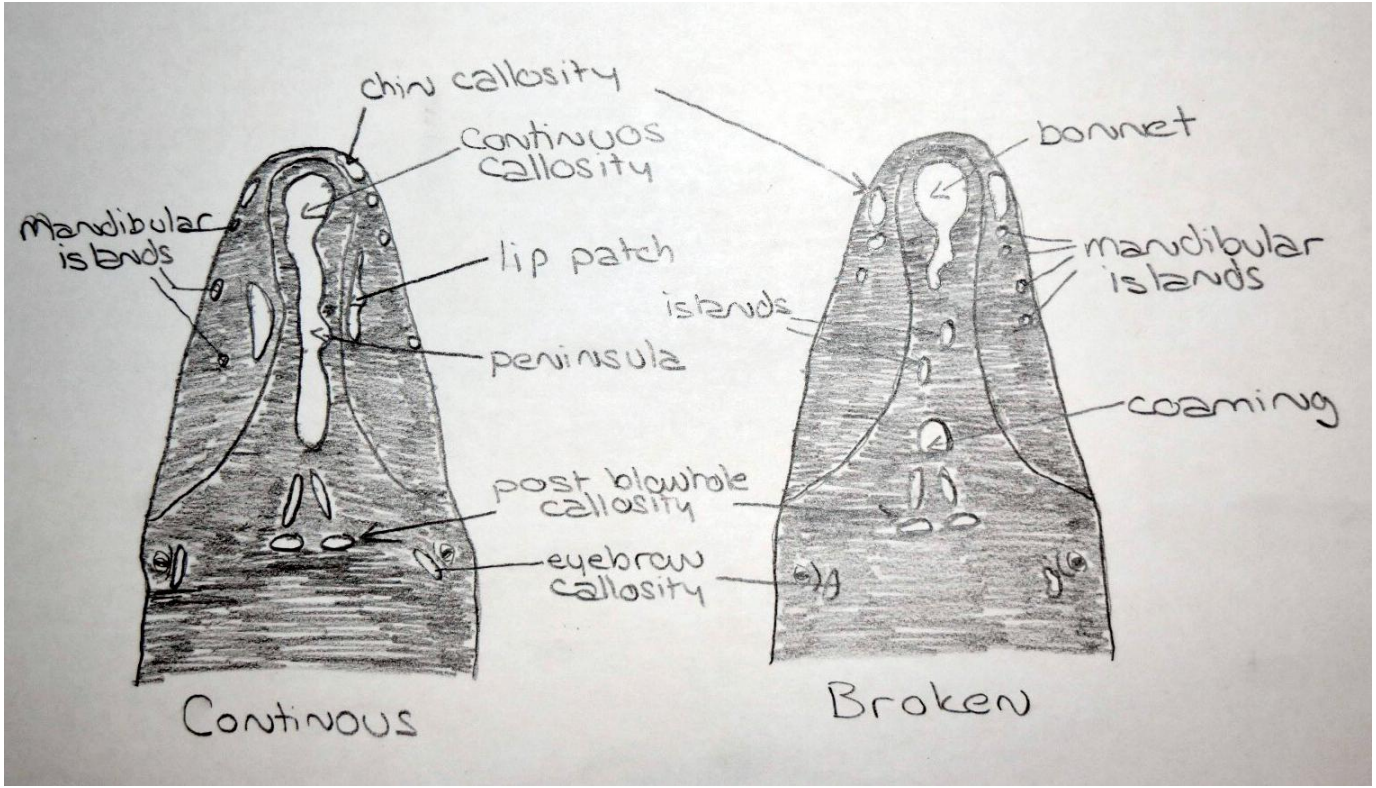

The true face of a right whale

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Why is it difficult?

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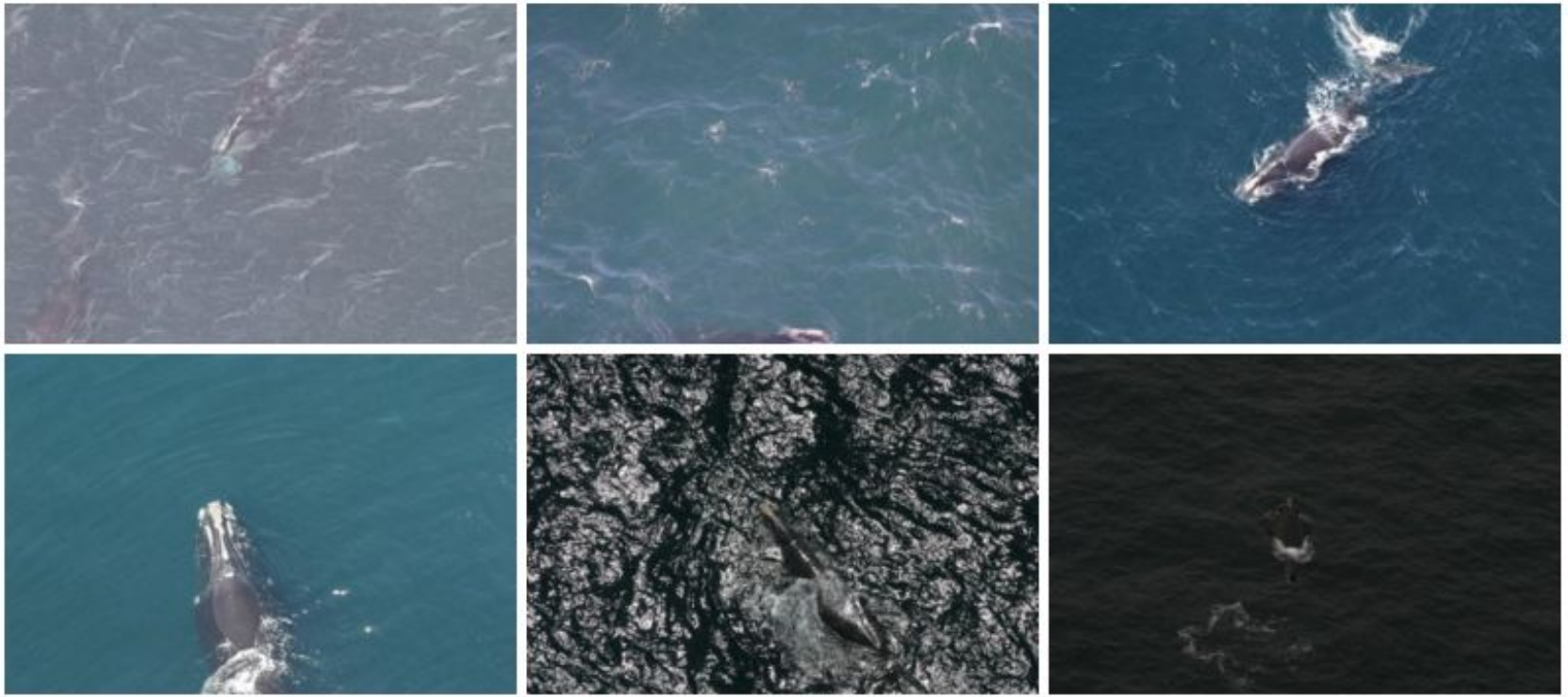

A non-random sample from the dataset

Why is it difficult?

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Not very cooperative whales

May I see your passport, please?

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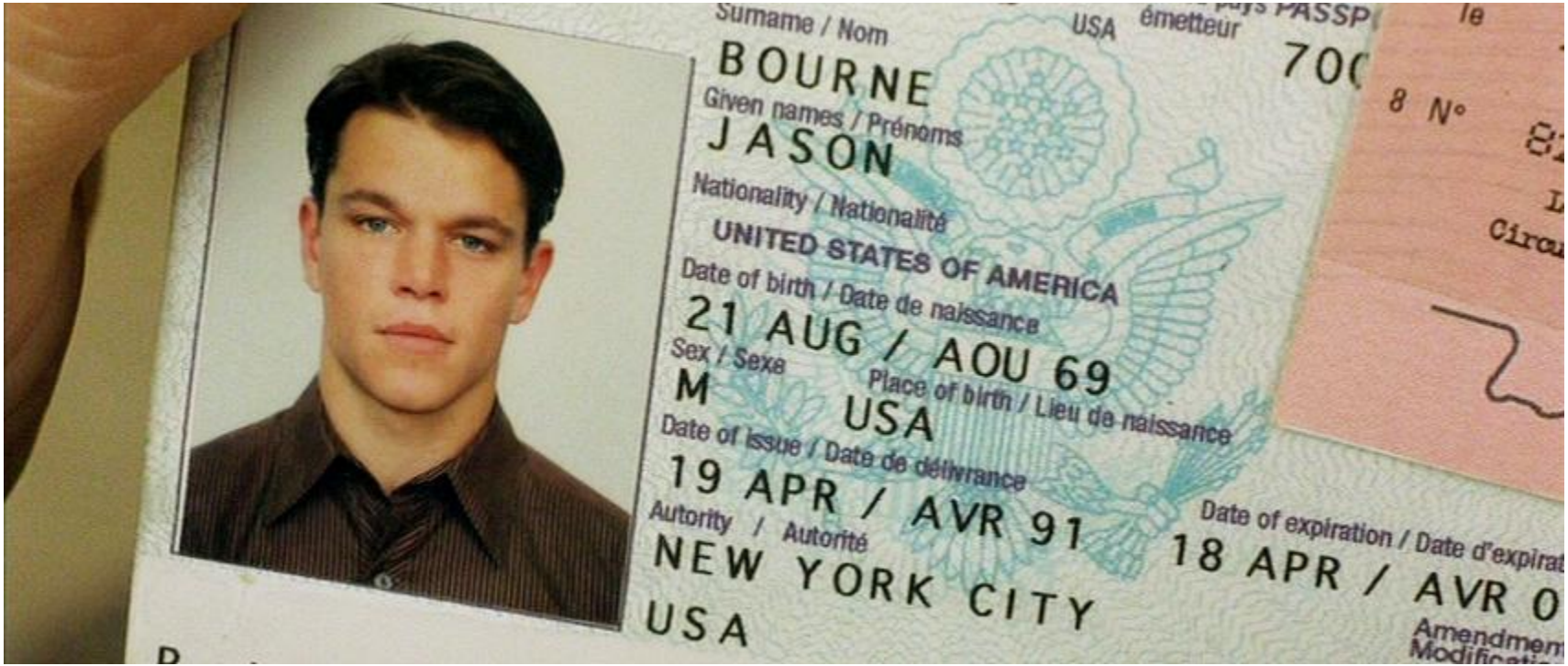

Outline of the solution

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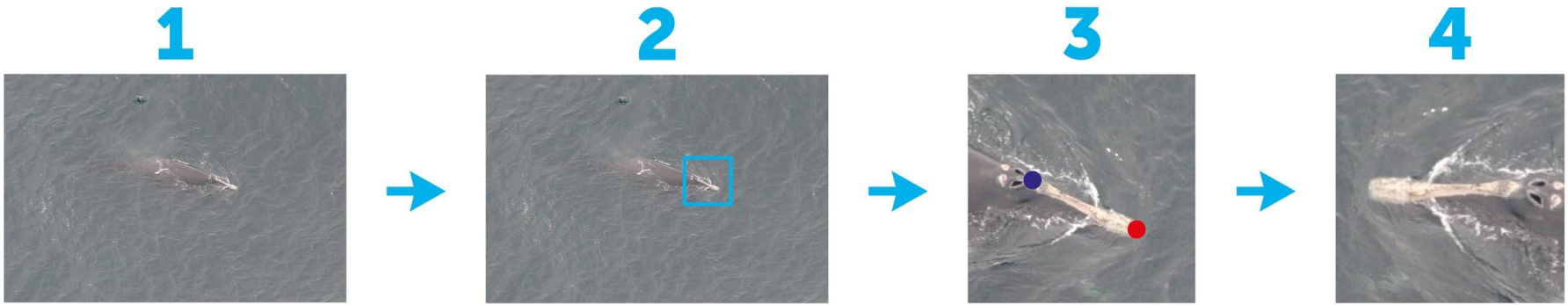

Where's Your Head At?

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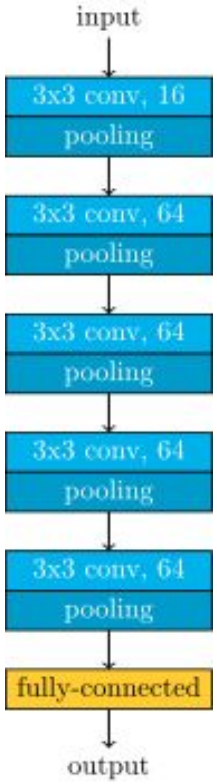

May I see your passport, please?

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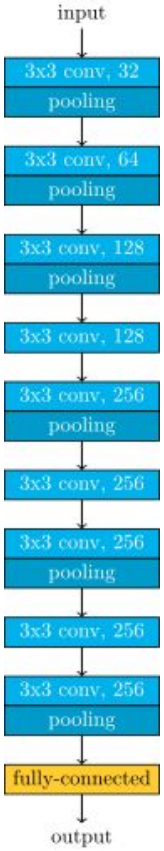
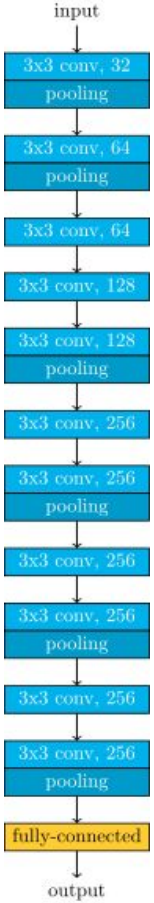
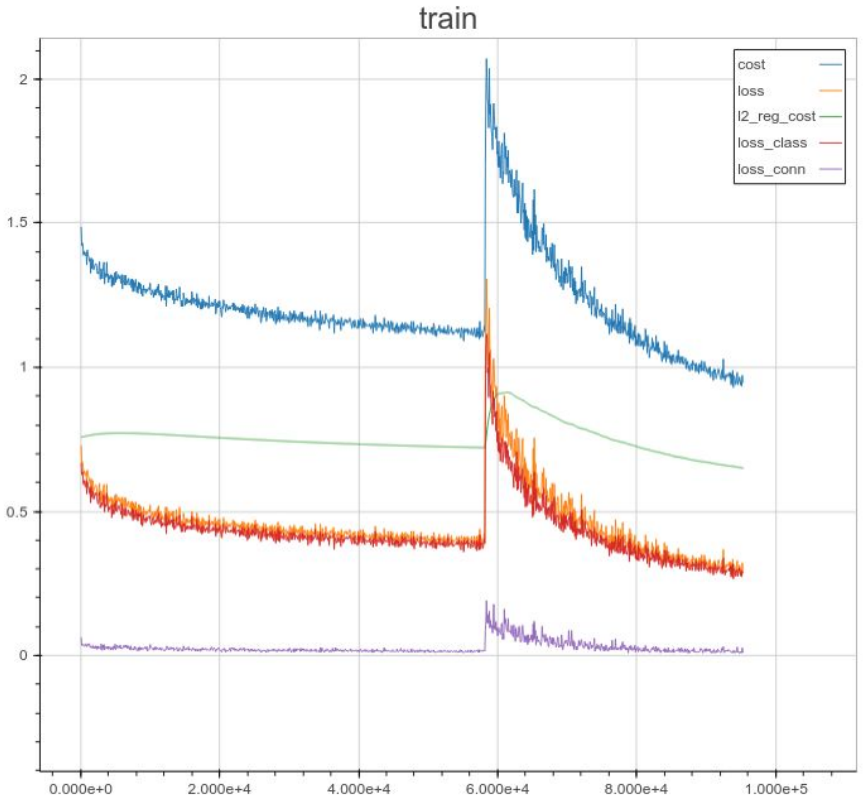


Final classifier

- 87% accuracy, 95% top5 accuracy
- always ensemble
- data augmentation everywhere
- “kicking” the learning rate
- auxiliary targets
- reusing validation set
- calibrating probabilities





How we got there?

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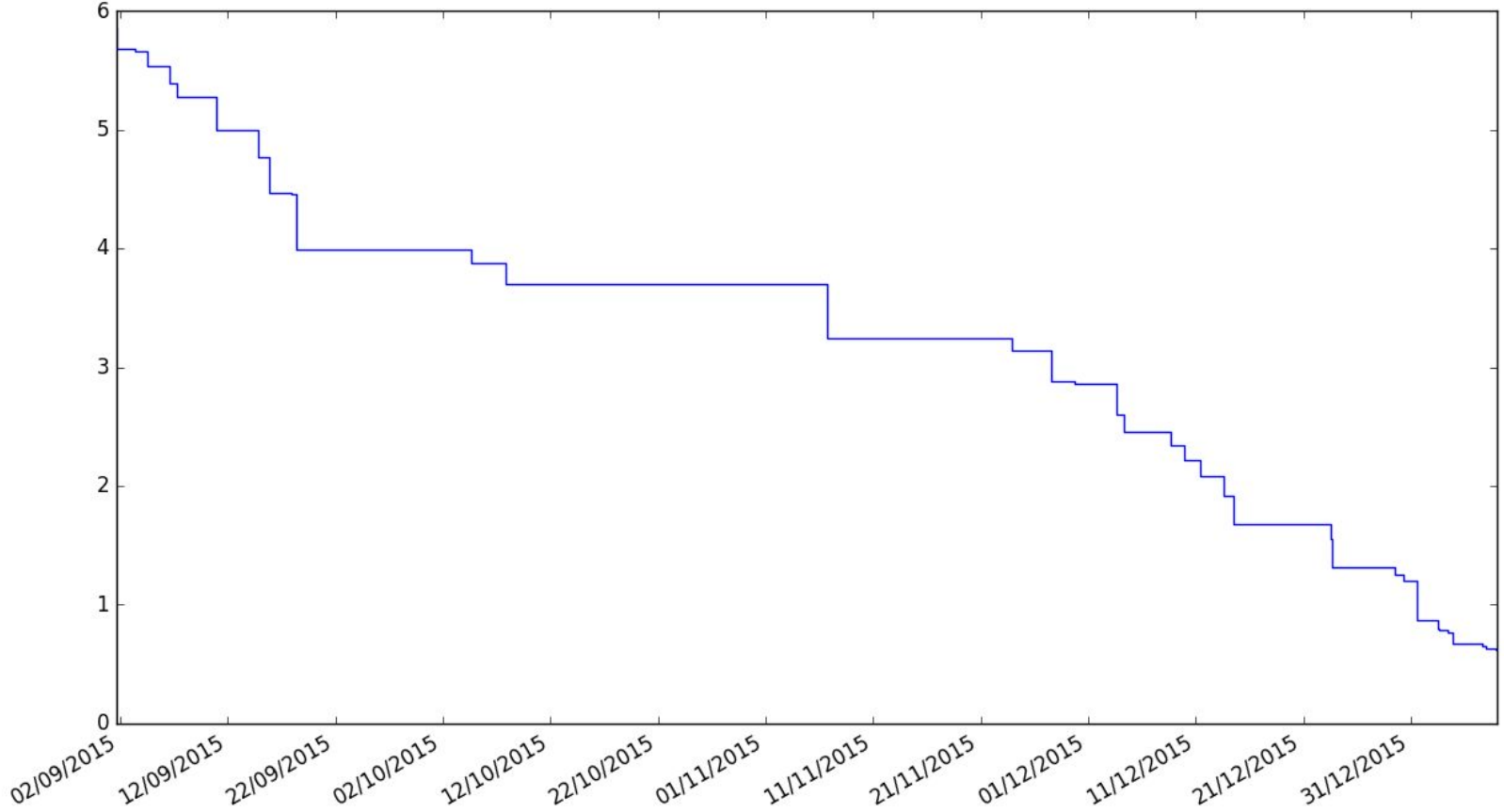

How we got there?

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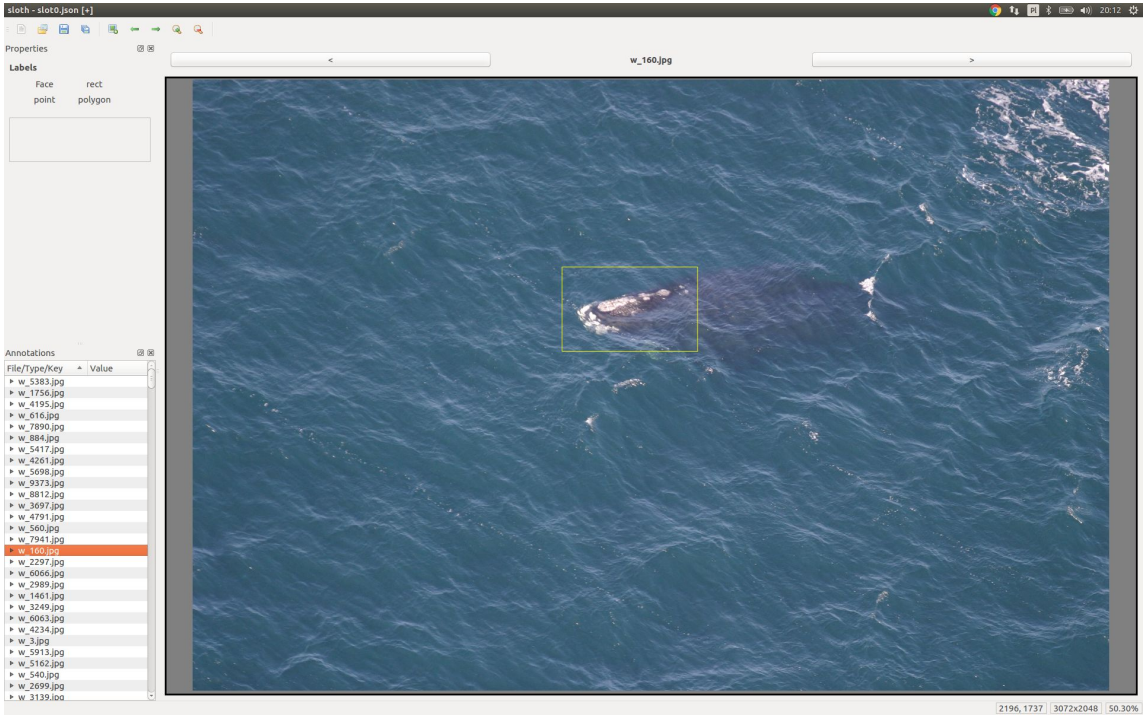
- Naive classification
- We have to label!
- Sloth



How to use the annotations?

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- Positive/negative sliding window
- Dividing the output into bins
- Bonnet-tip and blowhole annotations

Other things we tried, but...

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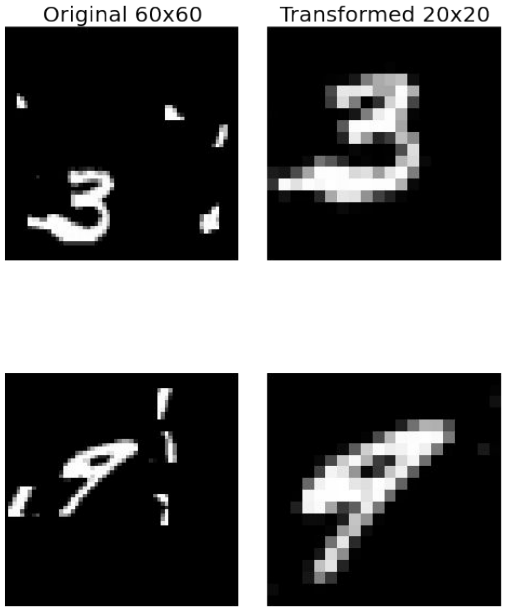
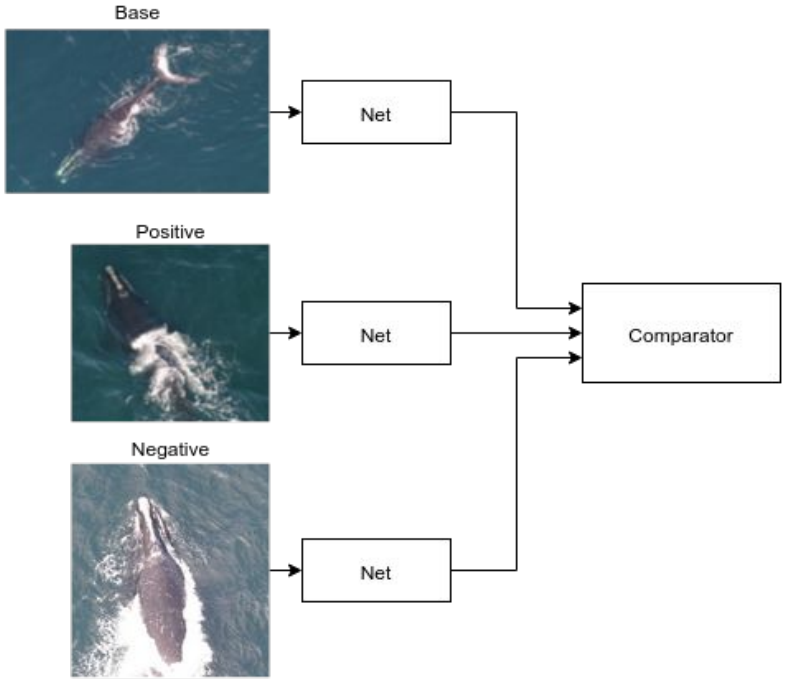
Transformer Networks



Triplet training



Neptune

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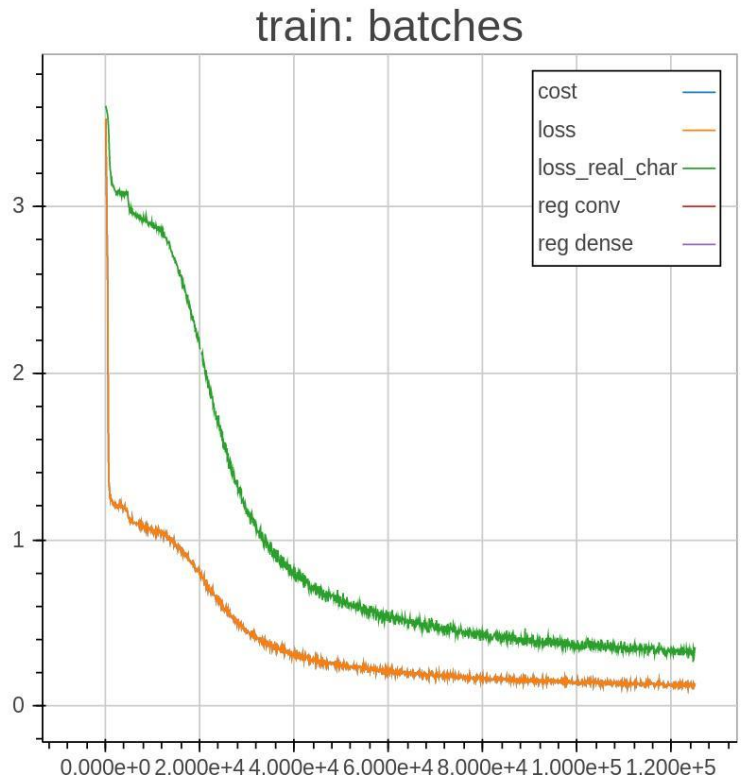
- Status of the training, plots
- Training many models in parallel
- History and reproducibility
- Sharing results with others



Keen to learn more?

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- ➔ maciej.klimek@deepsense.io
- ➔ http://deepsense.io/deep-learning-right-whale-recognition-kaggle/
- ➔ We are hiring!
- ➔ Ask questions!