



Detecting North Atlantic Right Whales in the Gulf of Saint Lawrence:

Notes on generalization

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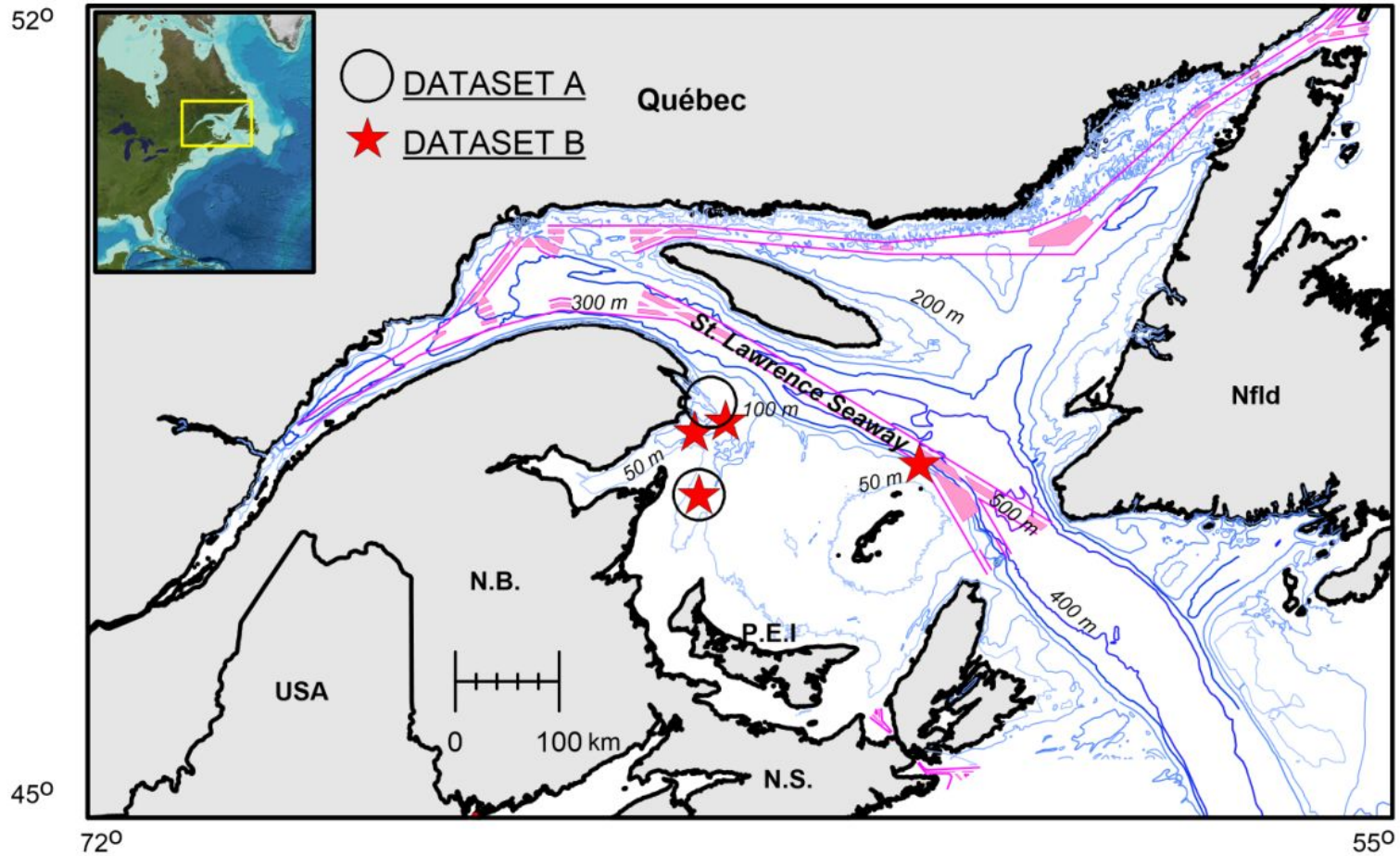
Oliver Kirsebom, Stan Matwin, Yvan Simard, Nathalie Roy, Samuel Giard

Detection and Classification in Marine Bioacoustics with Deep Learning

The Datasets



The datasets



The dataset



TABLE I. Datasets.

Dataset	Positives	Negatives	No. samples ^a
A	38%	62%	2078
B	60%	40%	3893
C	50%	50%	3000
AB	52%	48%	5971
ABC	52%	48%	8971

^a We use 85% of the samples for training and reserve 15% for testing.

The dataset

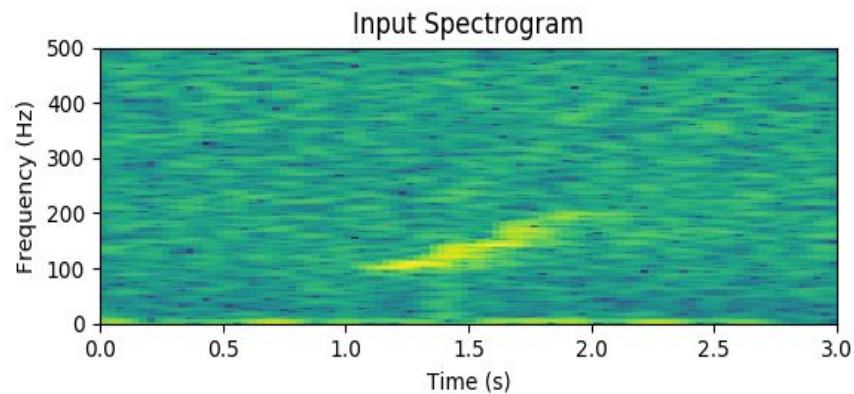


TABLE I. Datasets.

	Dataset	Positives	Negatives	No. samples ^a
Surface	A	38%	62%	2078
Bottom	B	60%	40%	3893
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The dataset

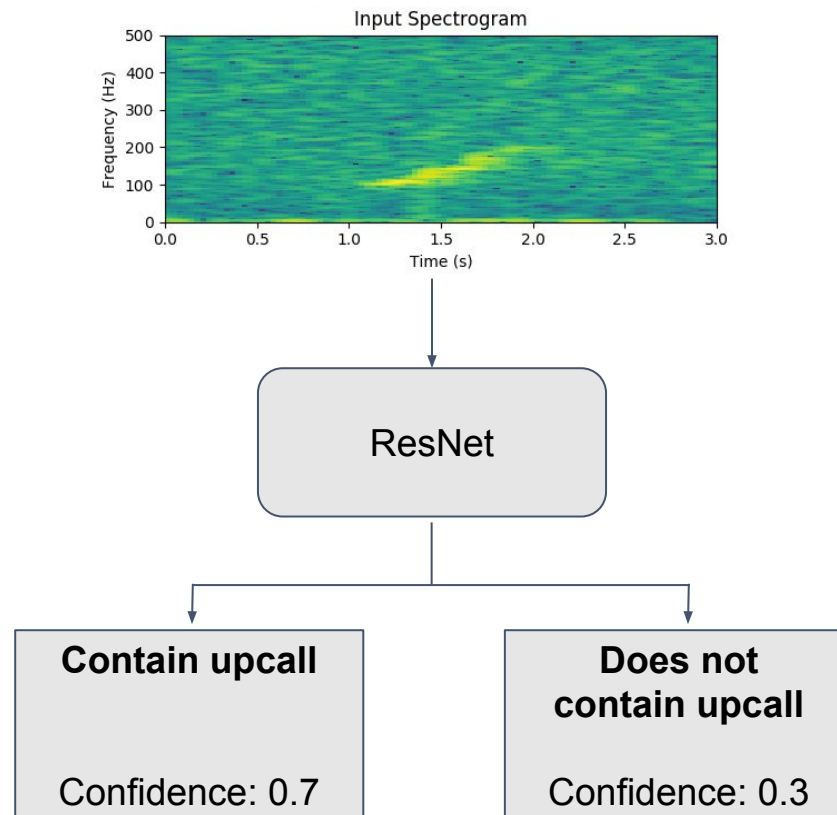


- 3 seconds long
- 256-point dft (discrete Fourier transform)
- Hann window
- 87% overlap

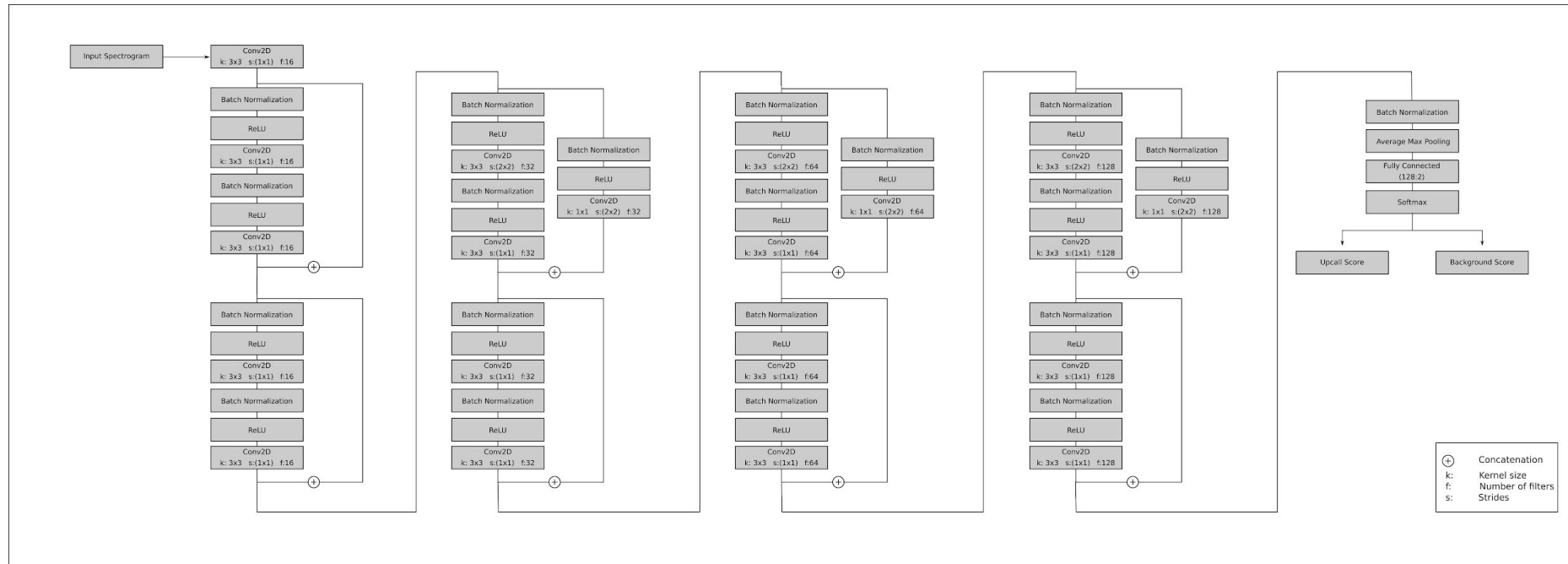
Frequency resolution = 3.9 Hz

Time resolution = 32 ms

The model



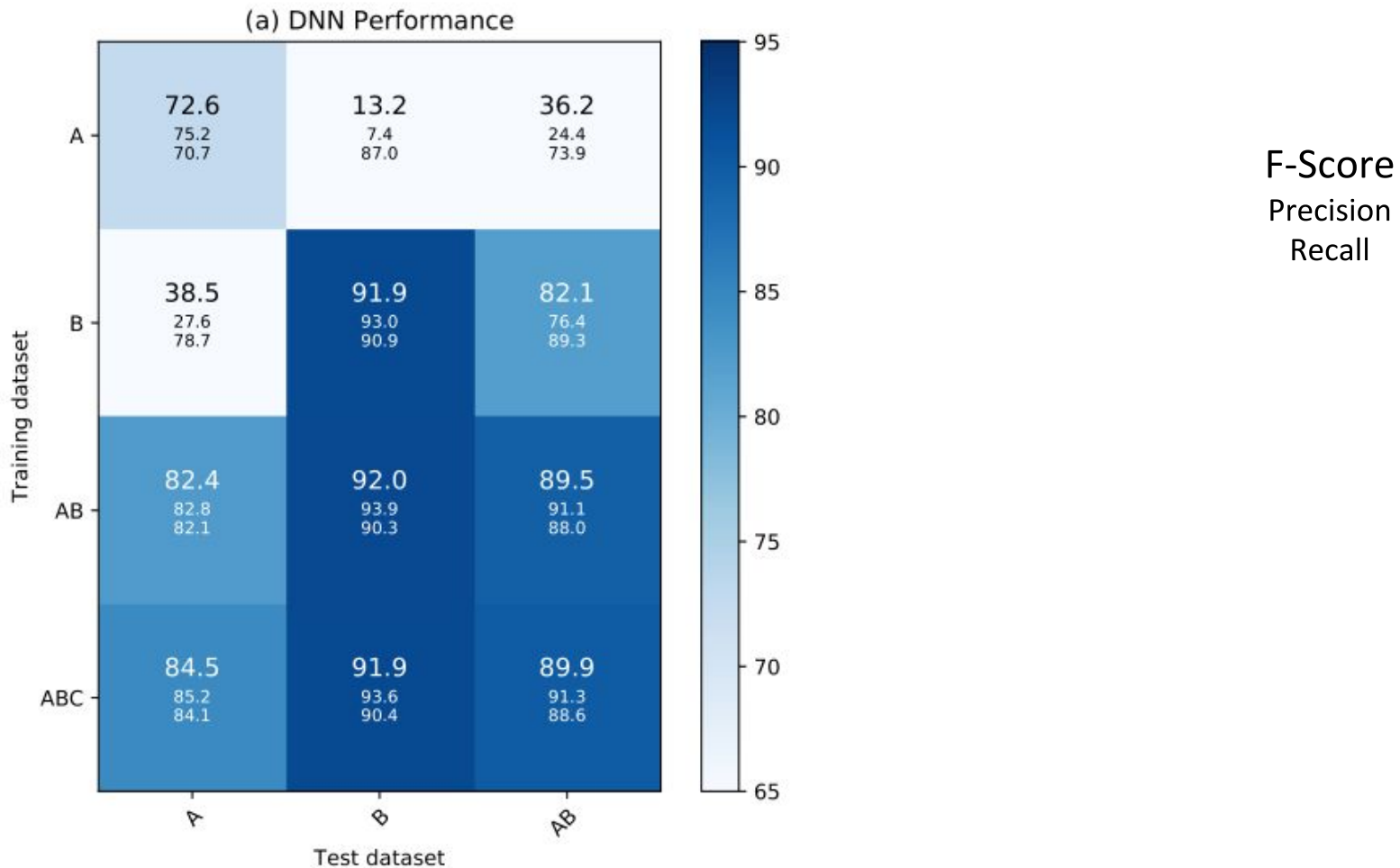
The model



Results



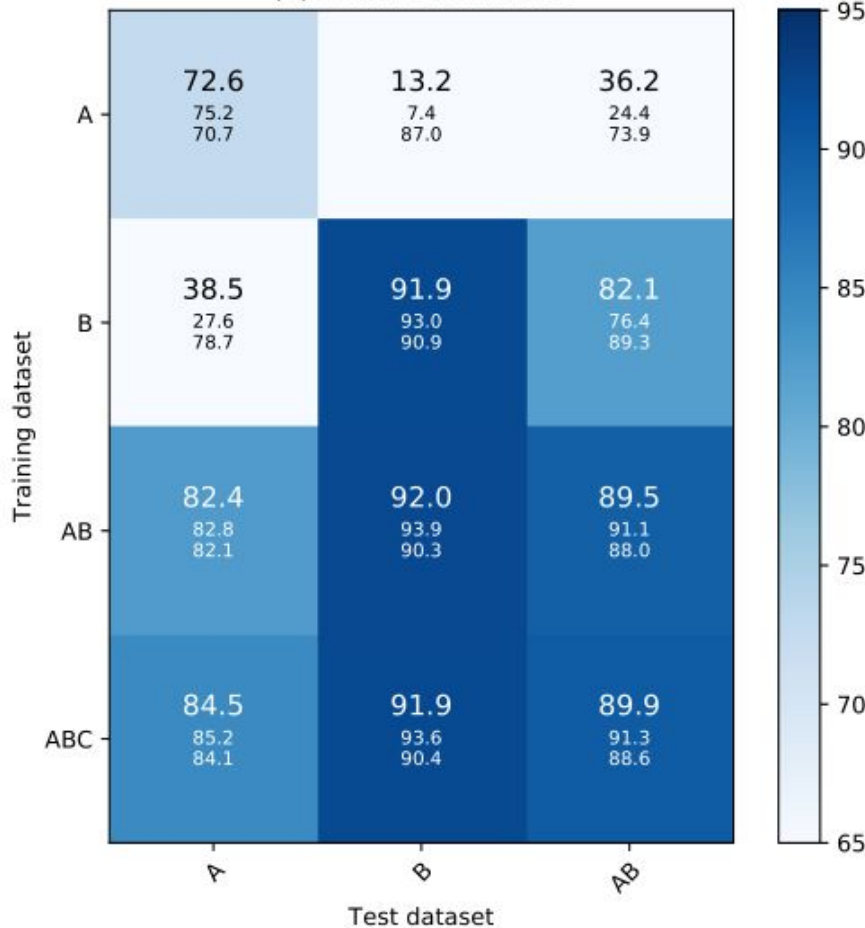
Results



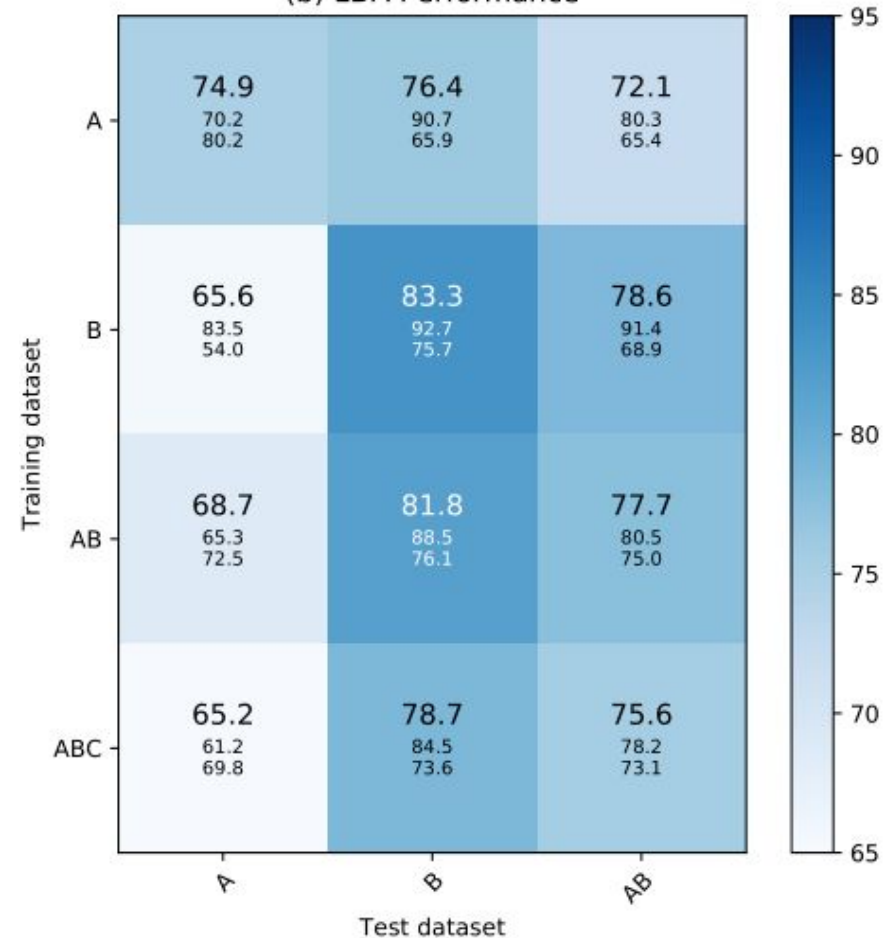
Results



(a) DNN Performance



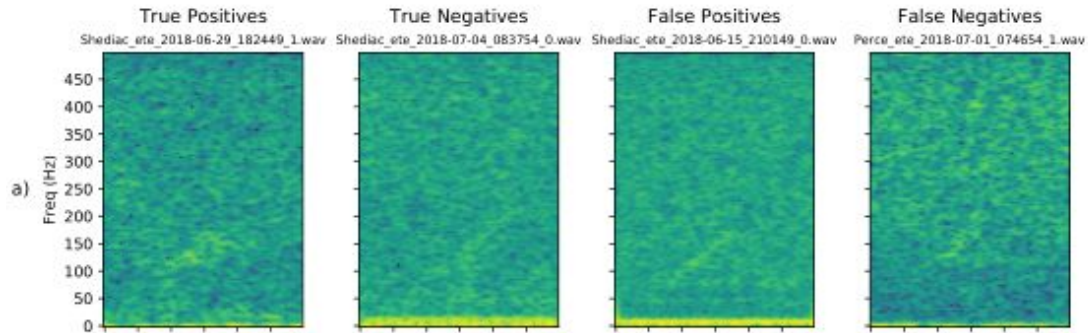
(b) LDA Performance



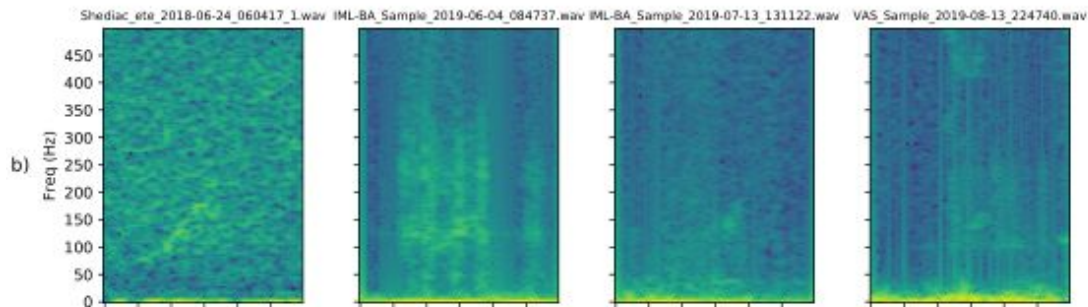
Results



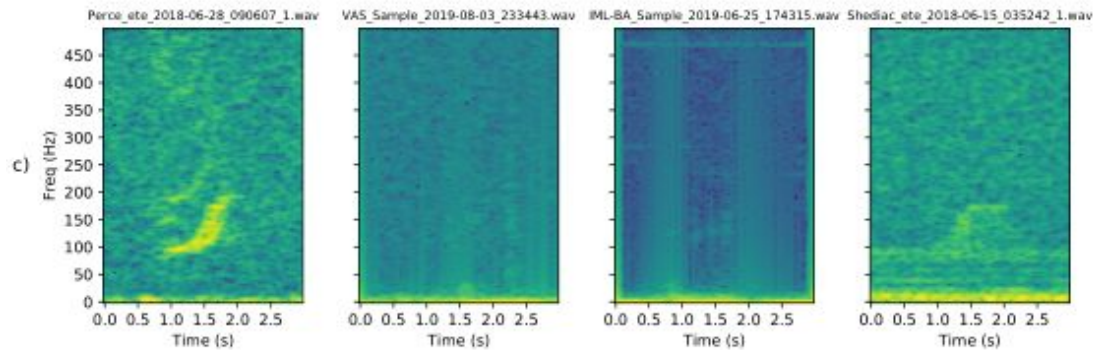
Uncertain



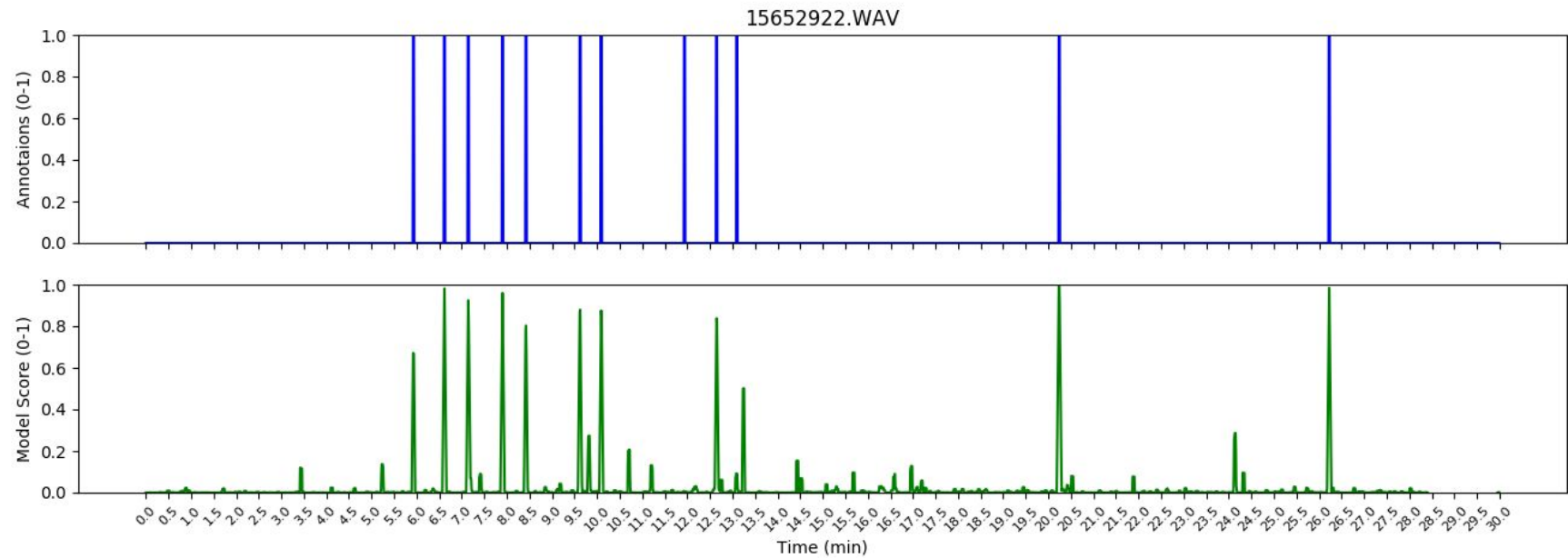
Certain but difficult



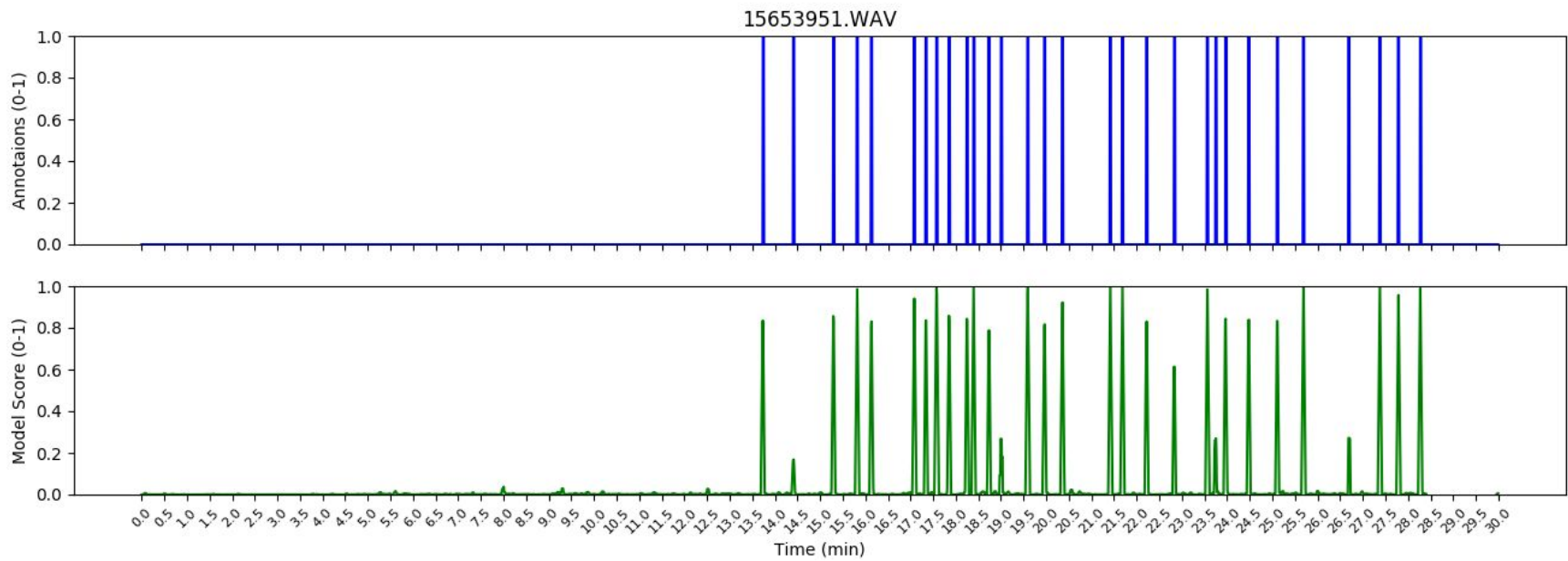
Certain and easy



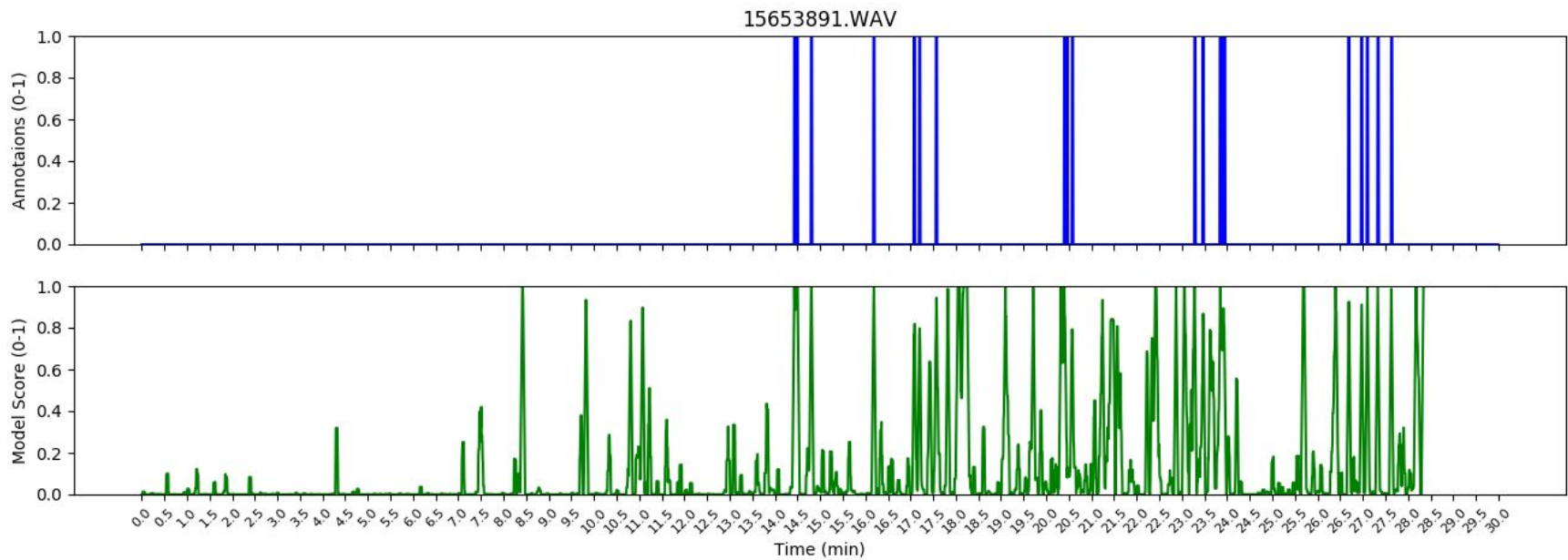
Results



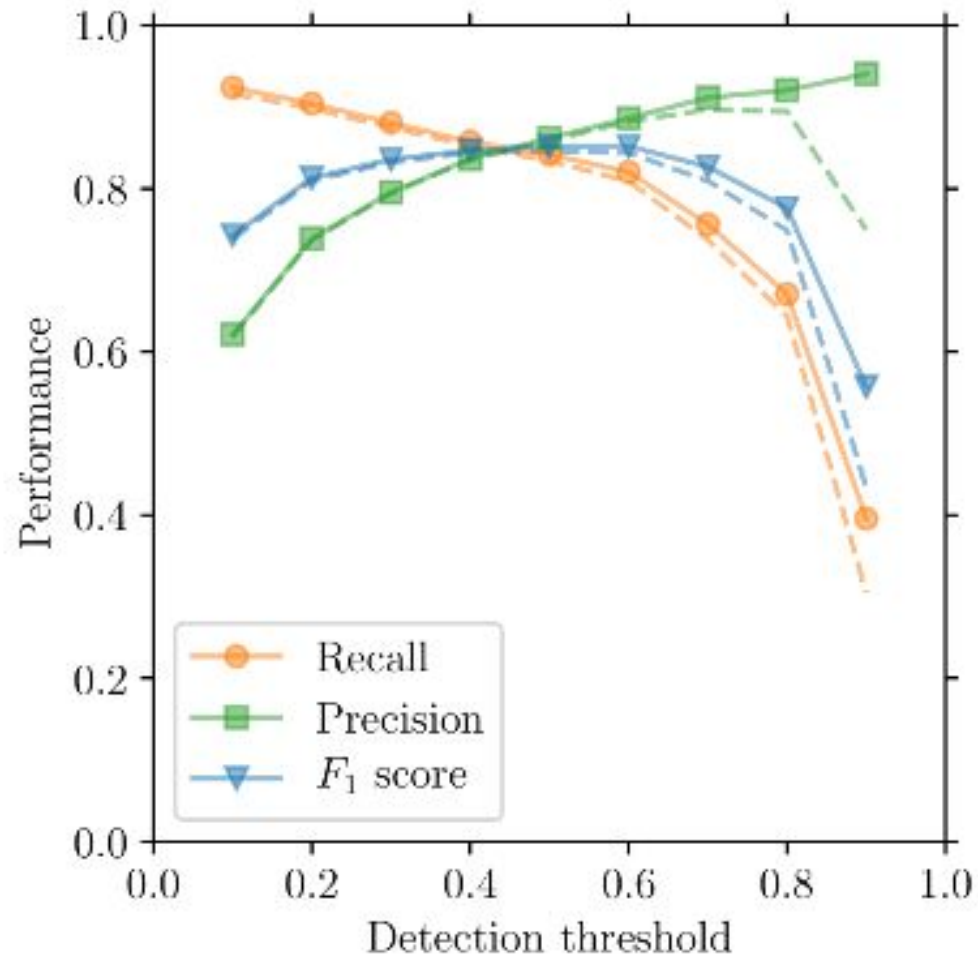
Results



Results



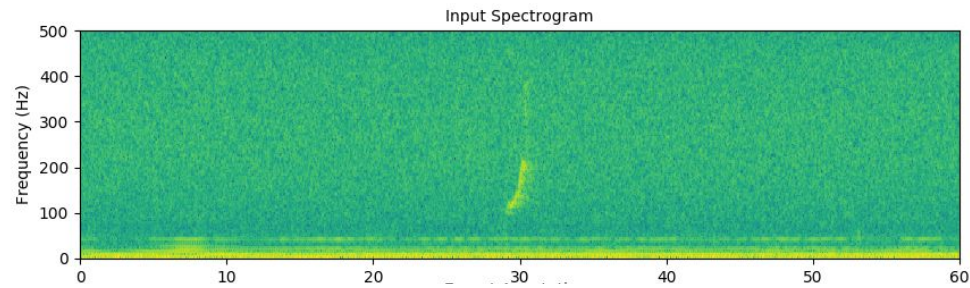
Results



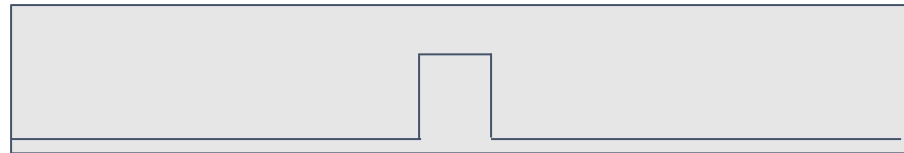
Seq2Seq model (preliminary results)



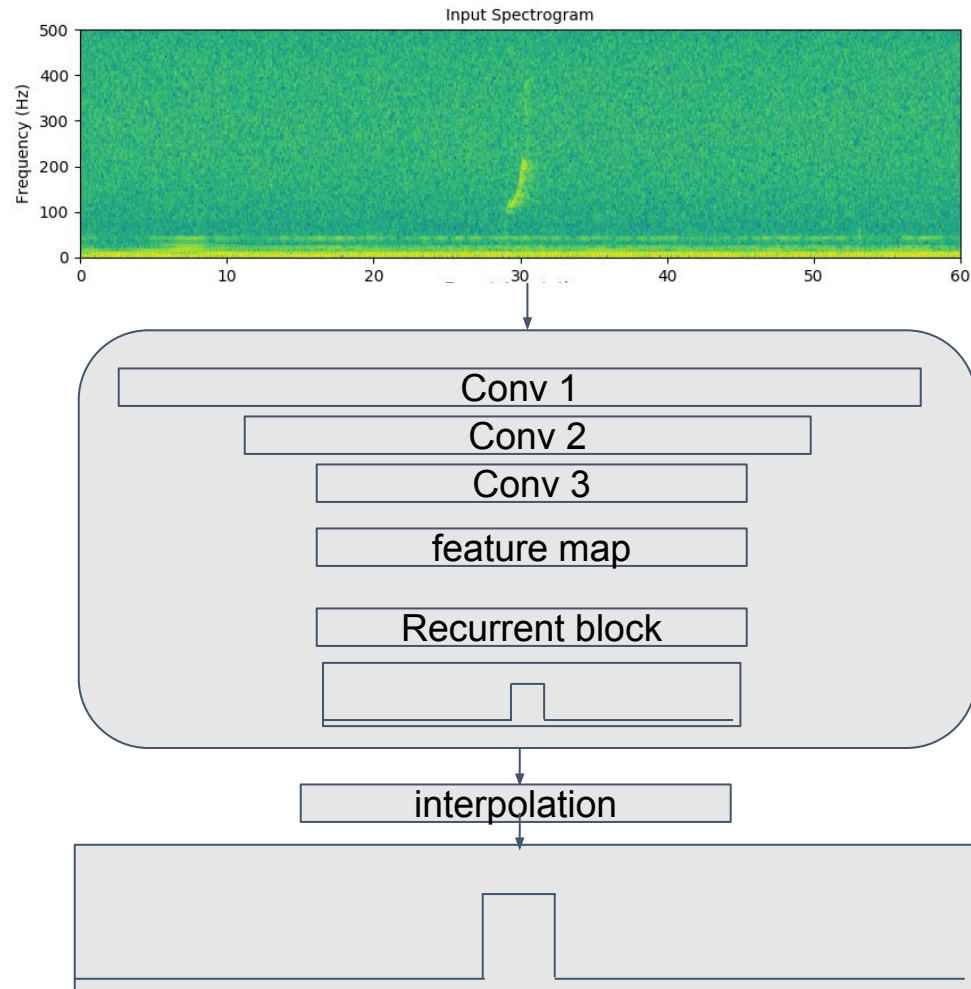
60s segments (Seq2Seq)



3 temporal convolutional layers
2 bidirectional GRU layers)
1 time-distributed dense layer
Loss function: $1-F_{0.5}$ score
Optimizer: Adam



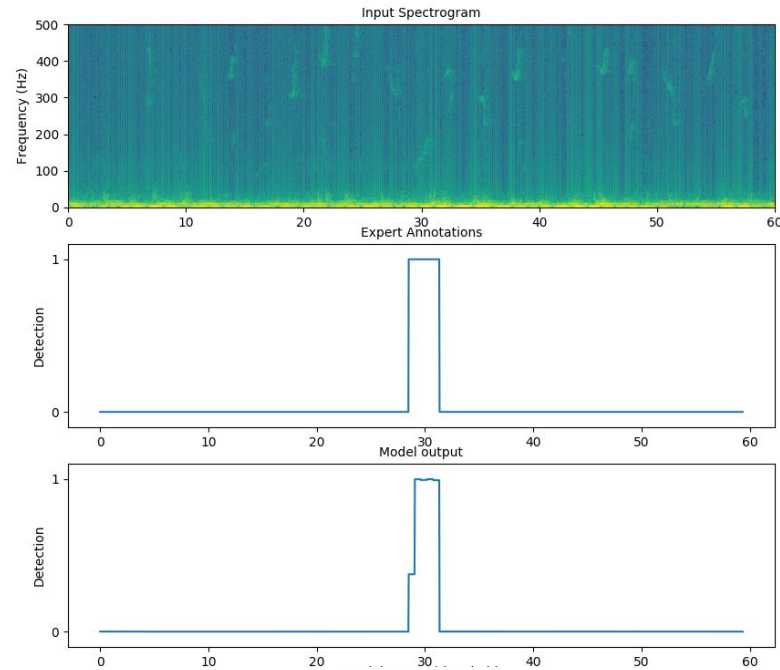
60s segments (Seq2Seq)



Preliminary Results



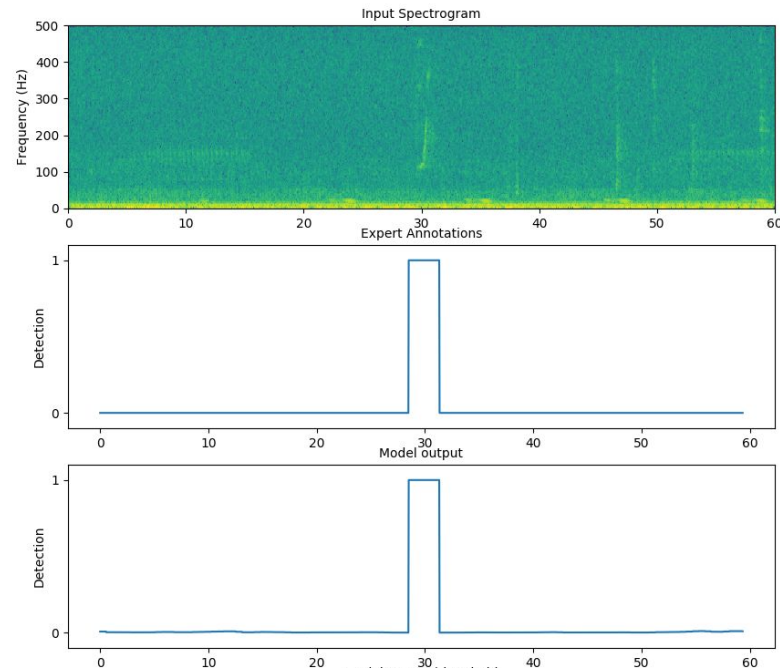
VAS_Sample_2019-08-20_172823.wav



Preliminary Results



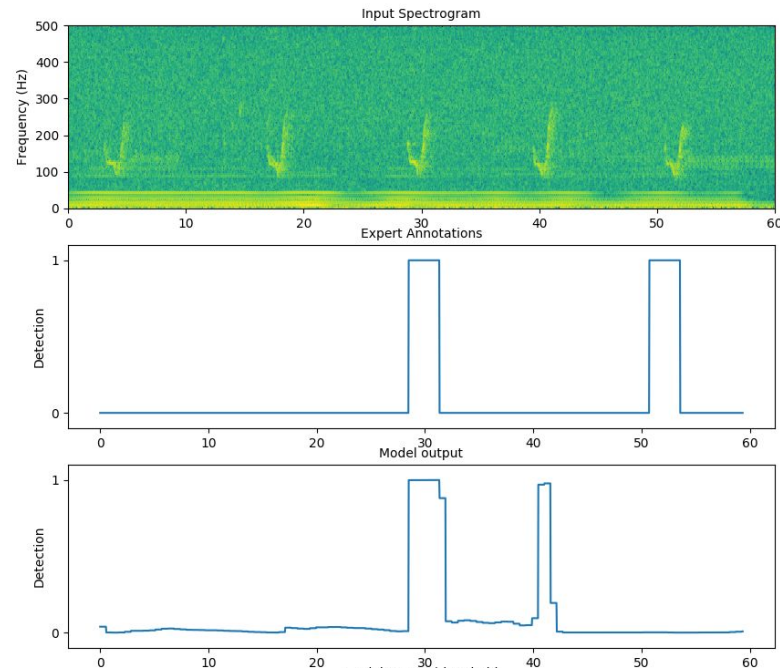
Shediac_ete_2018-07-09_210105_1.wav



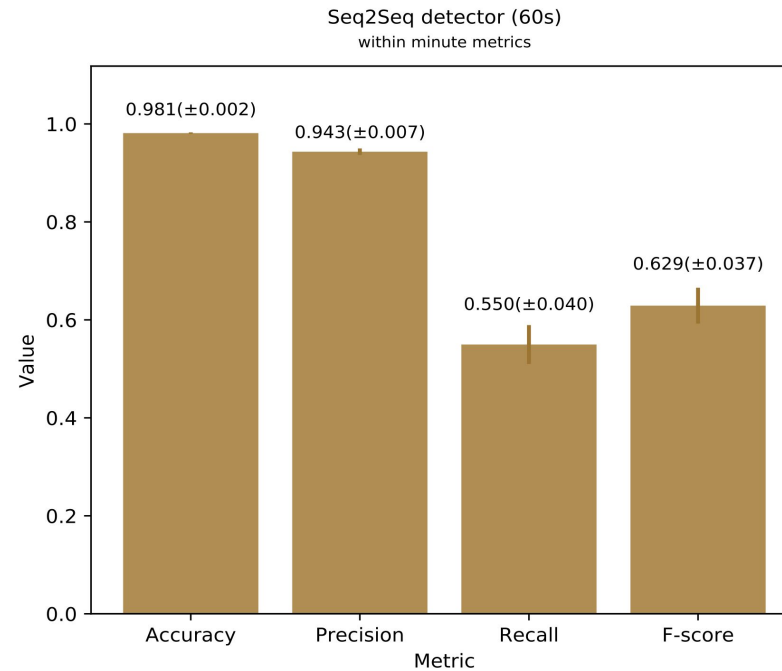
Preliminary Results



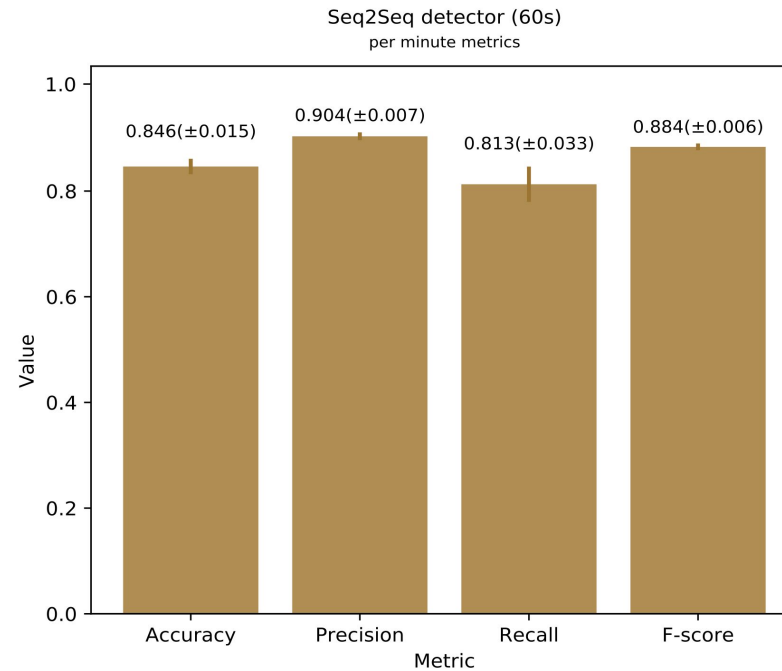
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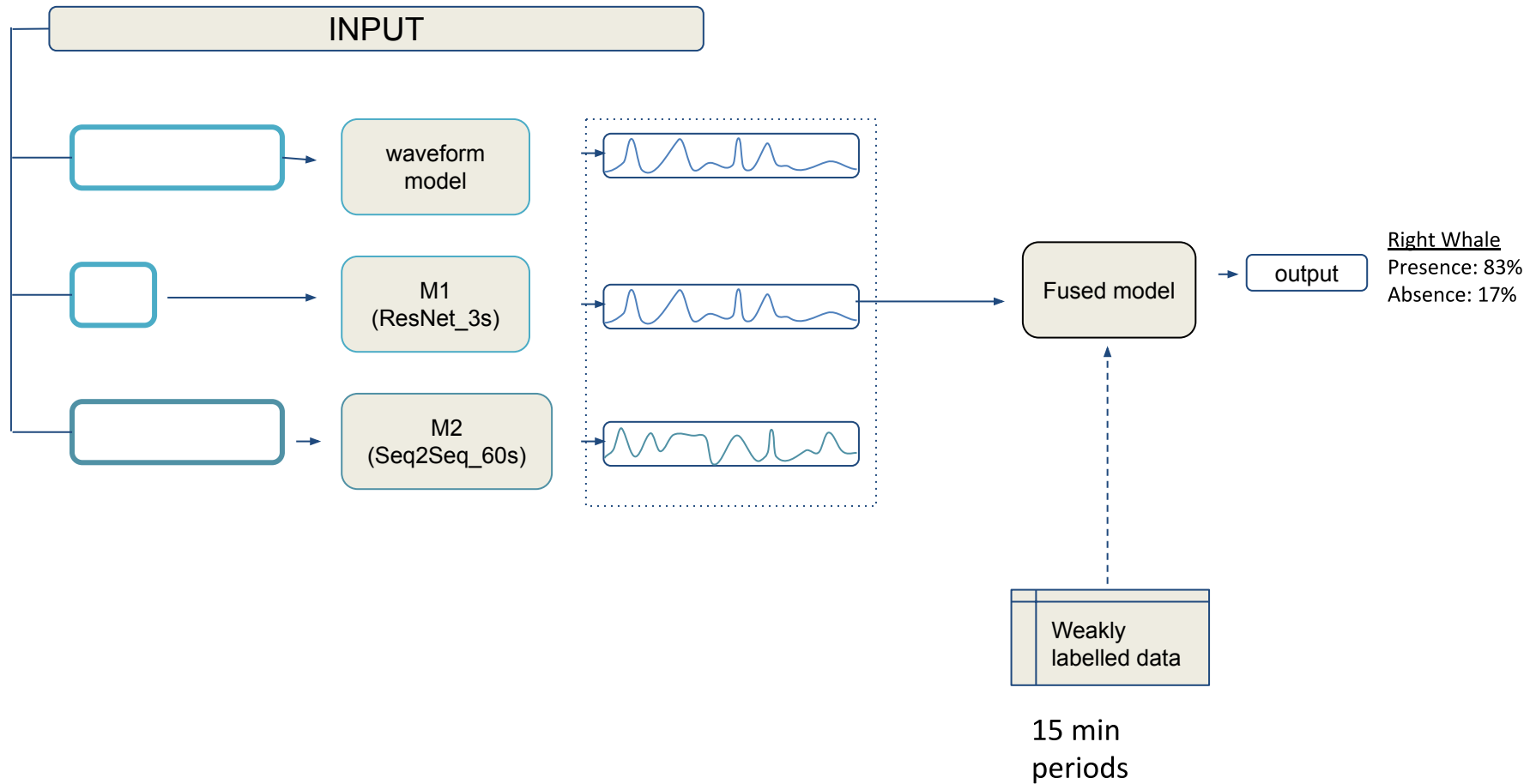
Preliminary Results



Preliminary Results



Preliminary Results



Thank you!

