

A Convolutional Neural Network to Diagnose Pneumonia from Chest X-Ray Images

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Background and Methods



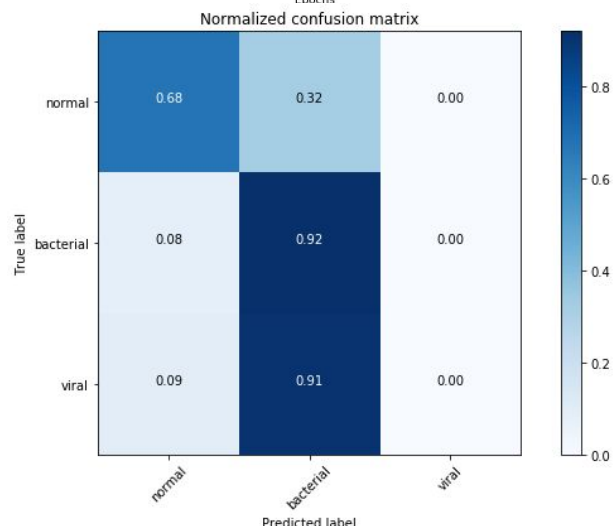
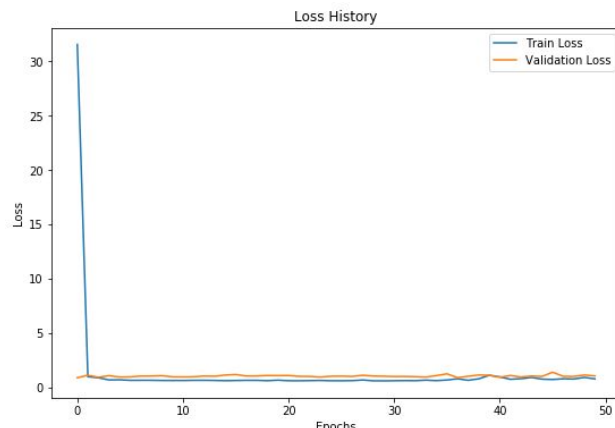
	Before normalizing			After normalizing		
	<i>Normal</i>	<i>Bacterial</i>	<i>Viral</i>	<i>Normal</i>	<i>Bacterial</i>	<i>Viral</i>
<i>Train</i>	1342	2530	1345	1342	1342	1342
<i>Validate</i>	9	8	0	74	74	74
<i>Test</i>	234	242	148	74	74	74

Table 1: Number of images for train, validate, and test sets per label, before and after pre processing.

Architecture:

- Xception model with imagenet weights and transfer learning
 - Xception, GAP, then dense layers
- Tested batch size, # hidden layers, epochs, learning rate

Results and Discussion



# of hidden layers	# of nodes	batch size	epochs	learning rate	train_acc	val_acc	train_F1	test_acc	test_F1
3	1024, 512, 3	64	50	0.01	80.338	64.414	.66	72.072	.619
→ -	-	32	50	0.01	64.206	52.703	.662	53.153	.734
-	-	64	50	0.1	33.93	33.333	NAN	33.333	.662
-	-	64	50	0.001	84.365	56.306	.666	68.648	.620
-	-	64	50	0.0001	87.621	68.468	.664	62.613	.640
-	-	64	100	0.01	64.405	44.144	.704	48.198	.720
-	-	64	200	0.01	65.896	53.604	.738	47.297	.695
6	1024, 512, 256, 128, 64, 3	64	50	0.01	76.609	70.721	.664	50.901	.725
-	-	32	50	0.01	76.261	72.973	.669	49.550	.718
-	-	64	50	0.1	34.079	33.333	NAN	33.333	.613
-	-	64	50	0.001	83.768	75.676	.664	75.676	.628
-	-	64	50	0.0001	91.499	66.216	.660	58.559	.639
-	-	64	100	0.01	78.523	70.721	.673	76.577	.614
-	-	64	200	0.01	66.219	51.820	.690	50.902	.711
9	1024, 512, 256, 128, 64, 32, 16, 8, 3	64	50	0.01	32.936	33.333	NAN	33.333	NAN
-	-	32	50	0.01	64.778	50.450	.670	50.901	.722
-	-	64	50	0.1	34.029	33.333	NAN	33.333	.662
-	-	64	50	0.001	31.668	33.333	NAN	33.333	NAN
-	-	64	50	0.0001	88.243	67.568	.665	70.721	.628
-	-	64	100	0.01	32.115	33.333	NAN	33.333	NAN
-	-	64	200	0.01	65.896	41.892	.712	33.333	.662