

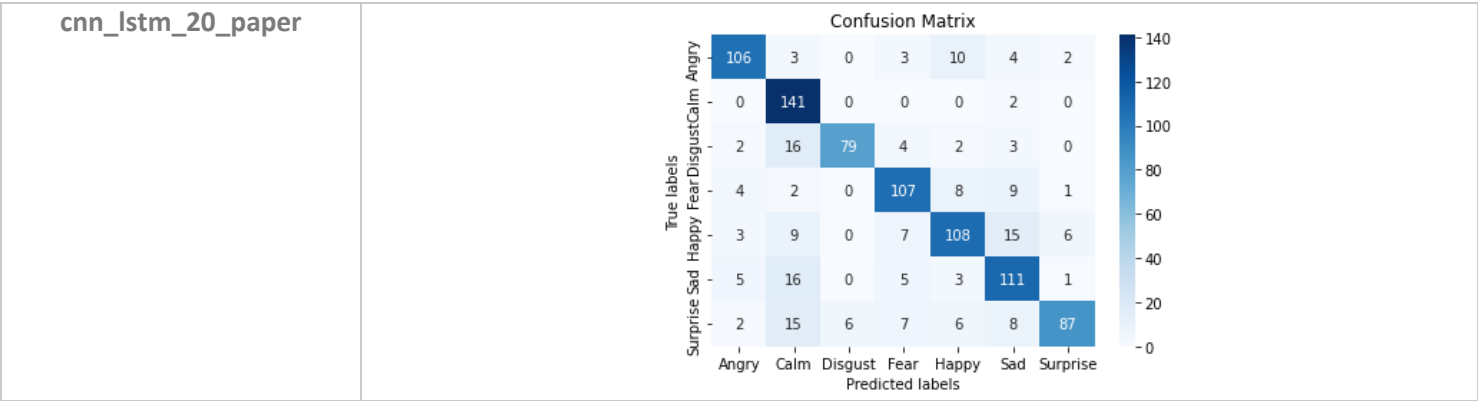
Empathic Art

Model Name	Progress
Baseline CNN	Done
CNN + LSTM	Done
MLP Classifier	Done

Model	Input Feature	Training Time	Epochs	Accuracy	F1-score	Loss
mlpClassifier_1.1	mfcc	26 sec	Alpha = 0.0001	66.12	77.38	4.60
mlpClassifier_1.2	mfcc	45 sec	Alpha = 0.01	76.81	82.95	0.05
baseline_cnn_11	mfcc	9 seconds	11	72.74%	72.83	0.70
baseline_cnn_20	mfcc	2:48	20	81.47%	81.53	0.55
cnn_lstm_11	Mfcc	12 seconds	11	73.60%	73.53	0.66
cnn_lstm_20	Mfcc	22 seconds	20	75.22%	75.02	0.66
cnn_lstm_500_paper	Mfcc	19:36 seconds	500	86.64%	86.78	0.89
cnn_lstm_20_paper	Mfcc	50 seconds	20	79.63%	79.74	0.63

Model	Confusion Matrix																																																								
mlpClassifier_1.1	<div><div>Confusion Matrix</div><table><tr><td>Angry</td><td>154</td><td>0</td><td>2</td><td>6</td><td>0</td><td>0</td><td>1</td></tr><tr><td>Calm</td><td>55</td><td>120</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td></tr><tr><td>Disgust</td><td>39</td><td>0</td><td>90</td><td>0</td><td>0</td><td>1</td><td>3</td></tr><tr><td>Fear</td><td>50</td><td>0</td><td>0</td><td>115</td><td>5</td><td>0</td><td>0</td></tr><tr><td>Happy</td><td>61</td><td>3</td><td>0</td><td>3</td><td>117</td><td>0</td><td>1</td></tr><tr><td>Sad</td><td>45</td><td>2</td><td>1</td><td>7</td><td>2</td><td>115</td><td>2</td></tr><tr><td>Surprise</td><td>63</td><td>0</td><td>1</td><td>1</td><td>2</td><td>1</td><td>92</td></tr></table></div>	Angry	154	0	2	6	0	0	1	Calm	55	120	0	0	0	0	0	Disgust	39	0	90	0	0	1	3	Fear	50	0	0	115	5	0	0	Happy	61	3	0	3	117	0	1	Sad	45	2	1	7	2	115	2	Surprise	63	0	1	1	2	1	92
Angry	154	0	2	6	0	0	1																																																		
Calm	55	120	0	0	0	0	0																																																		
Disgust	39	0	90	0	0	1	3																																																		
Fear	50	0	0	115	5	0	0																																																		
Happy	61	3	0	3	117	0	1																																																		
Sad	45	2	1	7	2	115	2																																																		
Surprise	63	0	1	1	2	1	92																																																		
mlpClassifier_1.2	<div><div>Confusion Matrix</div><table><tr><td>Angry</td><td>157</td><td>0</td><td>3</td><td>4</td><td>2</td><td>3</td><td>2</td></tr><tr><td>Calm</td><td>15</td><td>159</td><td>1</td><td>0</td><td>1</td><td>0</td><td>0</td></tr><tr><td>Disgust</td><td>12</td><td>1</td><td>131</td><td>0</td><td>2</td><td>0</td><td>1</td></tr><tr><td>Fear</td><td>18</td><td>2</td><td>3</td><td>137</td><td>2</td><td>3</td><td>3</td></tr><tr><td>Happy</td><td>18</td><td>2</td><td>4</td><td>12</td><td>116</td><td>2</td><td>1</td></tr><tr><td>Sad</td><td>23</td><td>9</td><td>5</td><td>9</td><td>7</td><td>103</td><td>3</td></tr><tr><td>Surprise</td><td>28</td><td>1</td><td>10</td><td>8</td><td>3</td><td>3</td><td>131</td></tr></table></div>	Angry	157	0	3	4	2	3	2	Calm	15	159	1	0	1	0	0	Disgust	12	1	131	0	2	0	1	Fear	18	2	3	137	2	3	3	Happy	18	2	4	12	116	2	1	Sad	23	9	5	9	7	103	3	Surprise	28	1	10	8	3	3	131
Angry	157	0	3	4	2	3	2																																																		
Calm	15	159	1	0	1	0	0																																																		
Disgust	12	1	131	0	2	0	1																																																		
Fear	18	2	3	137	2	3	3																																																		
Happy	18	2	4	12	116	2	1																																																		
Sad	23	9	5	9	7	103	3																																																		
Surprise	28	1	10	8	3	3	131																																																		

baseline_cnn_11	<div><p>Confusion Matrix</p><p>This heatmap shows the confusion matrix for the baseline_cnn_11 model. The x-axis represents predicted labels (Angry, Calm, Disgust, Fear, Happy, Sad, Surprise) and the y-axis represents true labels (Angry, Calm, Disgust, Fear, Happy, Sad, Surprise). The color scale ranges from 0 (light blue) to 120 (dark blue). The diagonal elements, representing correct classifications, are: Angry (85), Calm (135), Disgust (93), Fear (94), Happy (82), Sad (82), and Surprise (104).</p><table><tr><th>True labels \ Predicted labels</th><th>Angry</th><th>Calm</th><th>Disgust</th><th>Fear</th><th>Happy</th><th>Sad</th><th>Surprise</th></tr><tr><th>Angry</th><td>85</td><td>3</td><td>13</td><td>4</td><td>6</td><td>1</td><td>22</td></tr><tr><th>Calm</th><td>0</td><td>135</td><td>7</td><td>0</td><td>0</td><td>0</td><td>1</td></tr><tr><th>Disgust</th><td>3</td><td>17</td><td>93</td><td>1</td><td>2</td><td>1</td><td>3</td></tr><tr><th>Fear</th><td>2</td><td>12</td><td>7</td><td>94</td><td>8</td><td>2</td><td>11</td></tr><tr><th>Happy</th><td>1</td><td>5</td><td>10</td><td>3</td><td>82</td><td>2</td><td>14</td></tr><tr><th>Sad</th><td>3</td><td>17</td><td>10</td><td>4</td><td>1</td><td>82</td><td>10</td></tr><tr><th>Surprise</th><td>2</td><td>11</td><td>21</td><td>4</td><td>7</td><td>2</td><td>104</td></tr></table></div>	True labels \ Predicted labels	Angry	Calm	Disgust	Fear	Happy	Sad	Surprise	Angry	85	3	13	4	6	1	22	Calm	0	135	7	0	0	0	1	Disgust	3	17	93	1	2	1	3	Fear	2	12	7	94	8	2	11	Happy	1	5	10	3	82	2	14	Sad	3	17	10	4	1	82	10	Surprise	2	11	21	4	7	2	104
True labels \ Predicted labels	Angry	Calm	Disgust	Fear	Happy	Sad	Surprise																																																										
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baseline_cnn_20	<div><p>Confusion Matrix</p><p>This heatmap shows the confusion matrix for the baseline_cnn_20 model. The x-axis represents predicted labels (Angry, Calm, Disgust, Fear, Happy, Sad, Surprise) and the y-axis represents true labels (Angry, Calm, Disgust, Fear, Happy, Sad, Surprise). The color scale ranges from 0 (light blue) to 120 (dark blue). The diagonal elements, representing correct classifications, are: Angry (104), Calm (131), Disgust (97), Fear (107), Happy (95), Sad (96), and Surprise (126).</p><table><tr><th>True labels \ Predicted labels</th><th>Angry</th><th>Calm</th><th>Disgust</th><th>Fear</th><th>Happy</th><th>Sad</th><th>Surprise</th></tr><tr><th>Angry</th><td>104</td><td>1</td><td>3</td><td>13</td><td>4</td><td>2</td><td>7</td></tr><tr><th>Calm</th><td>0</td><td>131</td><td>0</td><td>1</td><td>2</td><td>5</td><td>4</td></tr><tr><th>Disgust</th><td>3</td><td>5</td><td>97</td><td>2</td><td>2</td><td>3</td><td>8</td></tr><tr><th>Fear</th><td>1</td><td>1</td><td>1</td><td>107</td><td>8</td><td>11</td><td>7</td></tr><tr><th>Happy</th><td>2</td><td>1</td><td>0</td><td>10</td><td>95</td><td>3</td><td>6</td></tr><tr><th>Sad</th><td>0</td><td>11</td><td>0</td><td>7</td><td>5</td><td>96</td><td>8</td></tr><tr><th>Surprise</th><td>3</td><td>0</td><td>3</td><td>8</td><td>8</td><td>3</td><td>126</td></tr></table></div>	True labels \ Predicted labels	Angry	Calm	Disgust	Fear	Happy	Sad	Surprise	Angry	104	1	3	13	4	2	7	Calm	0	131	0	1	2	5	4	Disgust	3	5	97	2	2	3	8	Fear	1	1	1	107	8	11	7	Happy	2	1	0	10	95	3	6	Sad	0	11	0	7	5	96	8	Surprise	3	0	3	8	8	3	126
True labels \ Predicted labels	Angry	Calm	Disgust	Fear	Happy	Sad	Surprise																																																										
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True labels \ Predicted labels	Angry	Calm	Disgust	Fear	Happy	Sad	Surprise																																																										
Angry	110	1	6	3	0	3	5																																																										
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Model	Classification Report					
mlpClassifier_1.1		precision	recall	f1-score	support	
		Angry	0.86	0.74	0.80	163
		Calm	0.96	0.69	0.80	175
		Disgust	0.96	0.68	0.79	133
		Fear	0.87	0.68	0.76	170
		Happy	0.92	0.64	0.75	185
		Sad	0.97	0.66	0.79	174
		Surprise	0.91	0.60	0.72	160
		micro avg	0.92	0.67	0.77	1160
		macro avg	0.92	0.67	0.77	1160
		weighted avg	0.92	0.67	0.77	1160
		samples avg	0.66	0.67	0.67	1160
		mlpClassifier_1.2		precision	recall	f1-score
Angry	0.88			0.86	0.87	171
Calm	0.91			0.91	0.91	176
Disgust	0.79			0.92	0.85	147
Fear	0.80			0.85	0.82	168
Happy	0.79			0.80	0.79	155
Sad	0.82			0.68	0.74	159
Surprise	0.88			0.76	0.81	184
micro avg	0.84			0.82	0.83	1160
macro avg	0.84			0.82	0.83	1160
weighted avg	0.84			0.82	0.83	1160
samples avg	0.80			0.82	0.81	1160
baseline_cnn_11				precision	recall	f1-score
		Angry	0.89	0.63	0.74	134
		Calm	0.68	0.94	0.79	143
		Disgust	0.58	0.78	0.66	120
		Fear	0.85	0.69	0.76	136
		Happy	0.77	0.70	0.74	117
		Sad	0.91	0.65	0.76	127
		Surprise	0.63	0.69	0.66	151
		accuracy			0.73	928
		macro avg	0.76	0.73	0.73	928
		weighted avg	0.76	0.73	0.73	928

baseline_cnn_20			precision	recall	f1-score	support		
			Angry	0.92	0.78	0.84	134	
			Calm	0.87	0.92	0.89	143	
			Disgust	0.93	0.81	0.87	120	
			Fear	0.72	0.79	0.75	136	
			Happy	0.77	0.81	0.79	117	
			Sad	0.78	0.76	0.77	127	
			Surprise	0.76	0.83	0.79	151	
			accuracy			0.81	928	
			macro avg	0.82	0.81	0.82	928	
			weighted avg	0.82	0.81	0.82	928	
	cnn_lstm_11			precision	recall	f1-score	support	
			Angry	0.76	0.77	0.77	128	
			Calm	0.70	0.92	0.80	143	
			Disgust	0.80	0.76	0.78	106	
			Fear	0.67	0.74	0.71	131	
			Happy	0.84	0.58	0.69	148	
			Sad	0.78	0.66	0.71	141	
			Surprise	0.66	0.73	0.69	131	
			accuracy			0.74	928	
			macro avg	0.75	0.74	0.74	928	
			weighted avg	0.75	0.74	0.73	928	
cnn_lstm_20		cnn_lstm_11						
cnn_lstm_500_paper			precision	recall	f1-score	support		
			Angry	0.87	0.92	0.90	128	
			Calm	0.96	0.93	0.95	143	
			Disgust	0.91	0.89	0.90	106	
			Fear	0.87	0.87	0.87	131	
			Happy	0.84	0.80	0.82	148	
			Sad	0.85	0.78	0.81	141	
			Surprise	0.77	0.89	0.83	131	
			accuracy			0.87	928	
			macro avg	0.87	0.87	0.87	928	
			weighted avg	0.87	0.87	0.87	928	
	cnn_lstm_20_paper			precision	recall	f1-score	support	
			Angry	0.87	0.83	0.85	128	
			Calm	0.70	0.99	0.82	143	
			Disgust	0.93	0.75	0.83	106	
			Fear	0.80	0.82	0.81	131	
			Happy	0.79	0.73	0.76	148	
			Sad	0.73	0.79	0.76	141	
			Surprise	0.90	0.66	0.76	131	
			accuracy			0.80	928	
			macro avg	0.82	0.79	0.80	928	
			weighted avg	0.81	0.80	0.80	928	

Model	Architecture
baseline_cnn_11	<div> <div> <div>dense_input</div> <div>input: [(None, 128)]</div> <div>input_layer</div> <div>output: [(None, 128)]</div> </div> <div>→</div> <div> <div>dense</div> <div>Dense</div> <div>float32</div> <div>(None, 128)</div> <div>(None, 256)</div> </div> <div>→</div> <div> <div>dropout</div> <div>Dropout</div> <div>float32</div> <div>(None, 256)</div> <div>(None, 256)</div> </div> <div>→</div> <div> <div>dense_1</div> <div>Dense</div> <div>float32</div> <div>(None, 256)</div> <div>(None, 256)</div> </div> <div>→</div> <div> <div>dropout_1</div> <div>Dropout</div> <div>float32</div> <div>(None, 256)</div> <div>(None, 256)</div> </div> <div>→</div> <div> <div>flatten</div> <div>Flatten</div> <div>float32</div> <div>(None, 256)</div> <div>(None, 256)</div> </div> <div>→</div> <div> <div>dropout_2</div> <div>Dropout</div> <div>float32</div> <div>(None, 256)</div> <div>(None, 256)</div> </div> <div>→</div> <div> <div>dense_2</div> <div>Dense</div> <div>float32</div> <div>(None, 256)</div> <div>(None, 7)</div> </div> </div>

