Facial Emotion Detection With Deep learning

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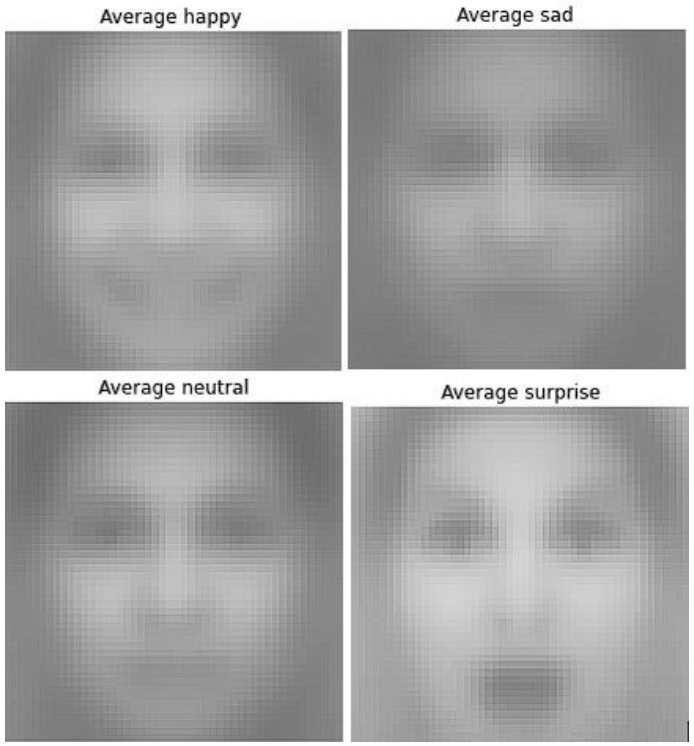
Problem Definition

- Bridging the Communication gap between humans and computers / AI
- Human facial expressions are a key component in how we communicate
- The global artificial intelligence market size valued at USD 136.55 Billion & Projected to expand at a compound annual growth rate (CAGR) of 37.3% from 2023 to 2030
- Use cases in medical field, Education, online therapy, security, aiding autistic people, and much more.

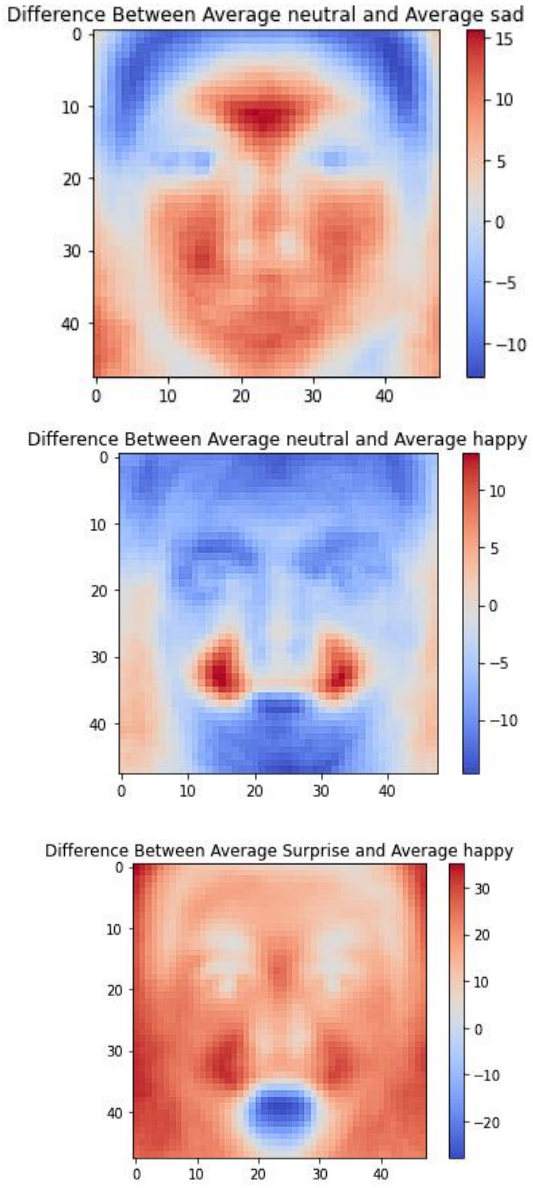
Solution approach

- What model architecture would be able to accurately categorize the human facial emotions?
- Dataset of 15,000 pictures categorized by emotion FER-2013
  - Model focuses on Happy, Sad, Neutral, and Surprised
- Convolutional Neural network (CNN) vs Transfer learning (Pre-trained weights)

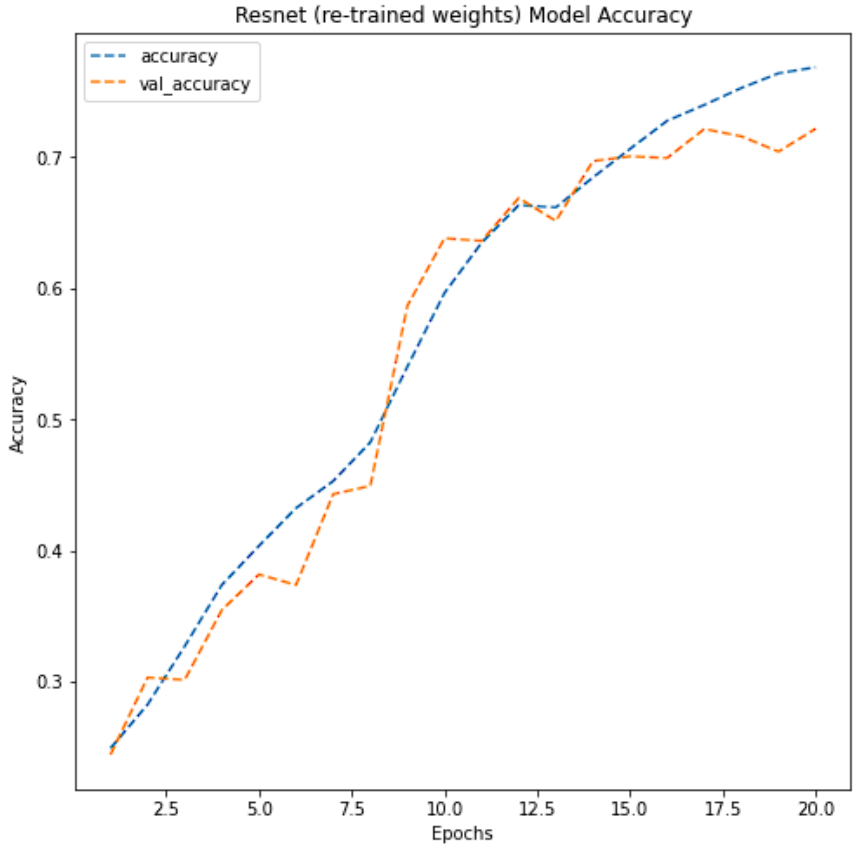


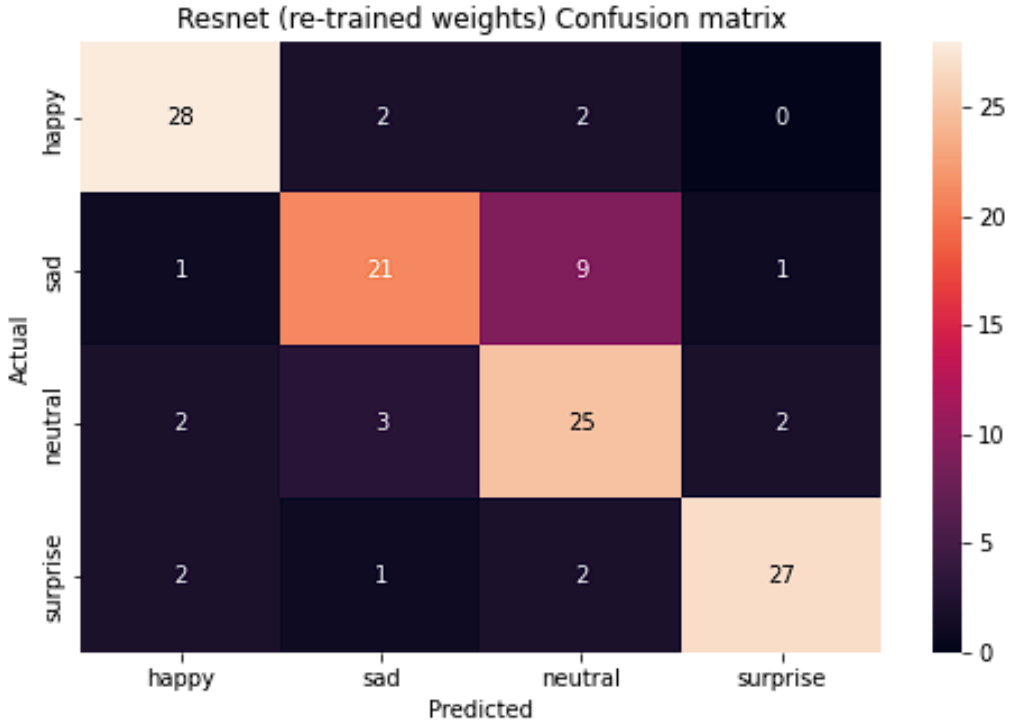
Proposed Solution

- Resnet architecture with retrained weights
  - Outperformed other CNNs in training and testing
  - Reached 80% accuracy when predicting categories
- Transfer learning models only reached 35% accuracy
  - Pre-Trained on data sets of random image for object detection



Re-trained Resnet Model Result's





Recommendations & Next steps

- Adding more emotions to training data before finalizing model
- Create a front end for live facial emotion recognition
- Test in live scenarios
  - Customer service Chatbots
  - Security cameras
  - Augmented reality
- Attempt using VGG face transfer learning model

Executive Summary

- Re-Trained Resnet model can accurately predict emotions on the human face with few hiccups
  - 80% testing accuracy
- Facial Emotional recognition is a multifaceted sector of deep learning that can save many companies money and time
- Can be used in
  - Classrooms for personalized education
  - Online therapy
  - Customer service
    - Used in hand with AI chatbots as well as customer service reps
  - Aid Autistic people in determining emotions of those around them.
  - Overall improvement of human interaction with technology

Thank You

Work Cited

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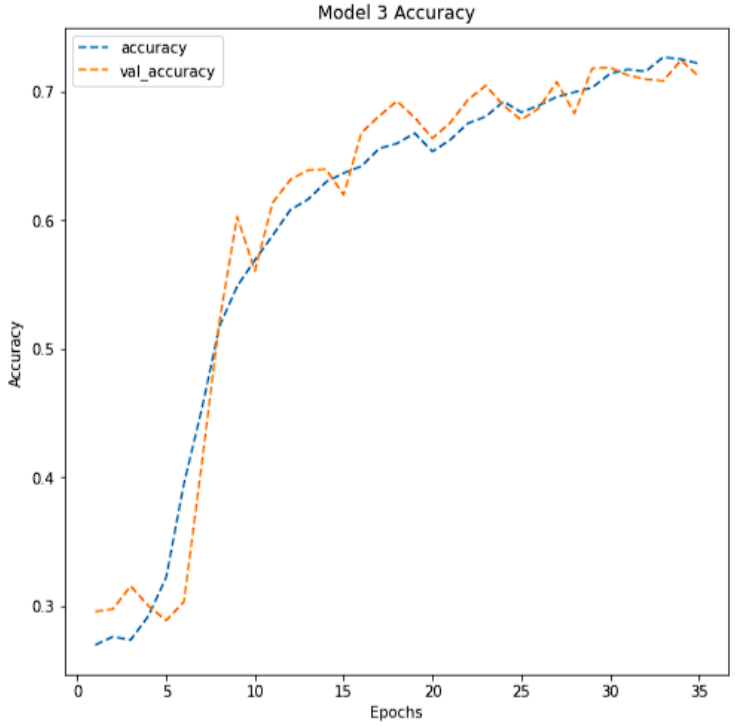
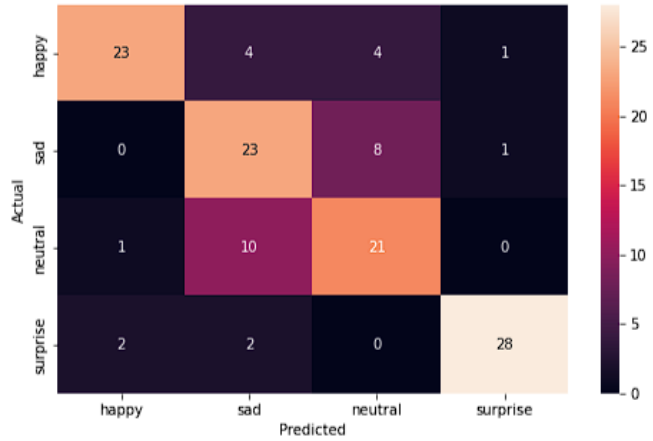
APPENDIX

CNN MODEL 3 RESULTS



	precision	recall	f1-score	support
0	0.88	0.72	0.79	32
1	0.59	0.72	0.65	32
2	0.64	0.66	0.65	32
3	0.93	0.88	0.90	32
accuracy			0.74	128
macro avg	0.76	0.74	0.75	128
weighted avg	0.76	0.74	0.75	128



MORE RESULTS FOR RE-TRAINED RESNET MODEL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4/4 [==============================] - 2s 16ms/step
              precision    recall  f1-score   support

           0       0.93      0.81      0.87        32
           1       0.79      0.69      0.73        32
           2       0.65      0.81      0.72        32
           3       0.91      0.91      0.91        32

    accuracy                           0.80       128
   macro avg       0.82      0.80      0.81       128
weighted avg       0.82      0.80      0.81       128
```