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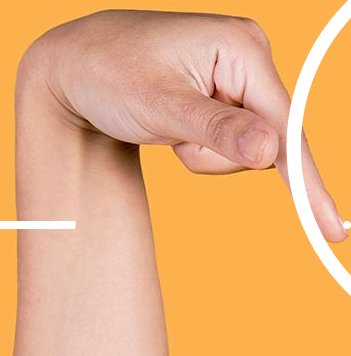


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# Image Classification of ASL Alphabets

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# Motivation

- ASL (American Sign Language) is expressed by movements of hands and face used by the deaf, hard of hearing and hearing nonverbal communities
- Deaf students are considered as a linguistic minority
- National shortage of sign language interpreters in the United States. 19 % growth in jobs by 2028

# Solution

Build a deep learning algorithm that can  
translate American Sign Language into  
English



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# >>>> Data

- Kaggle
  - Image information for each alphabet in sign language
  - Training/test data: 27000/7000 images and 784 columns of pixel info
- Classes
  - 25 alphabets and balanced



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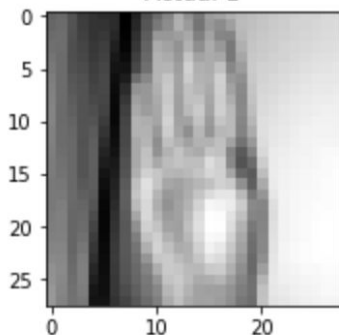
# Logistic Regression

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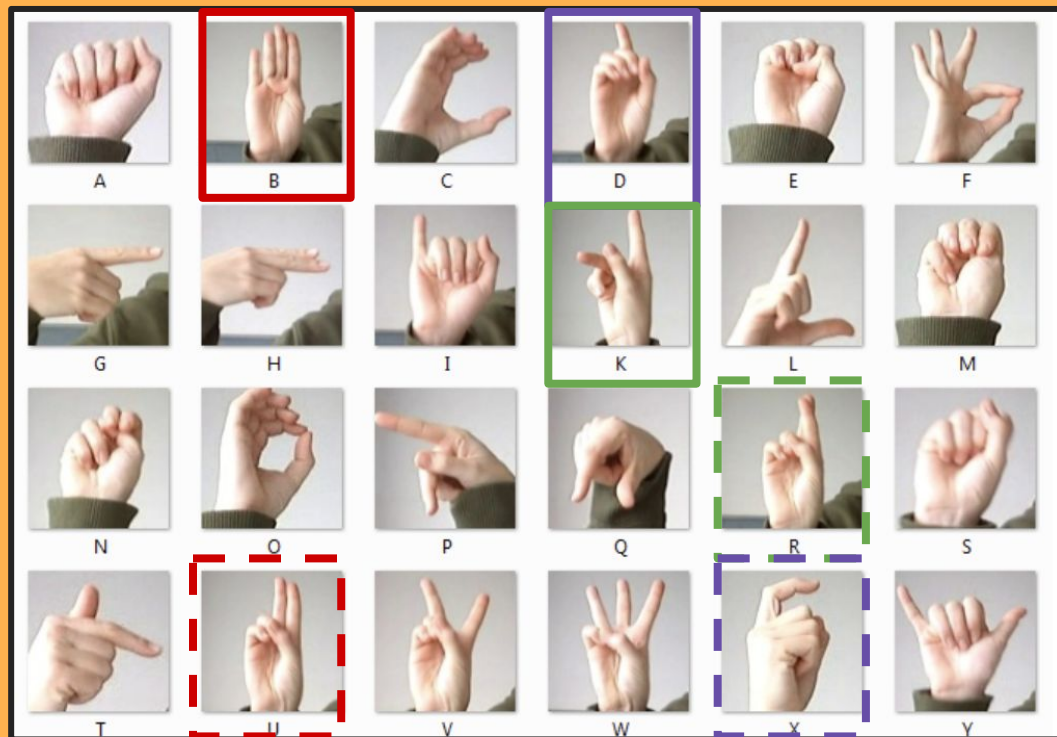
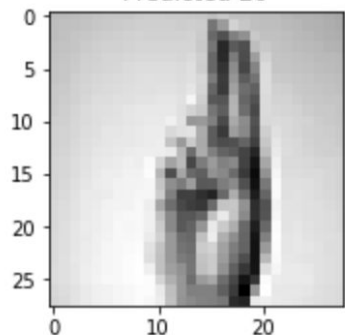
Accuracy

0.70

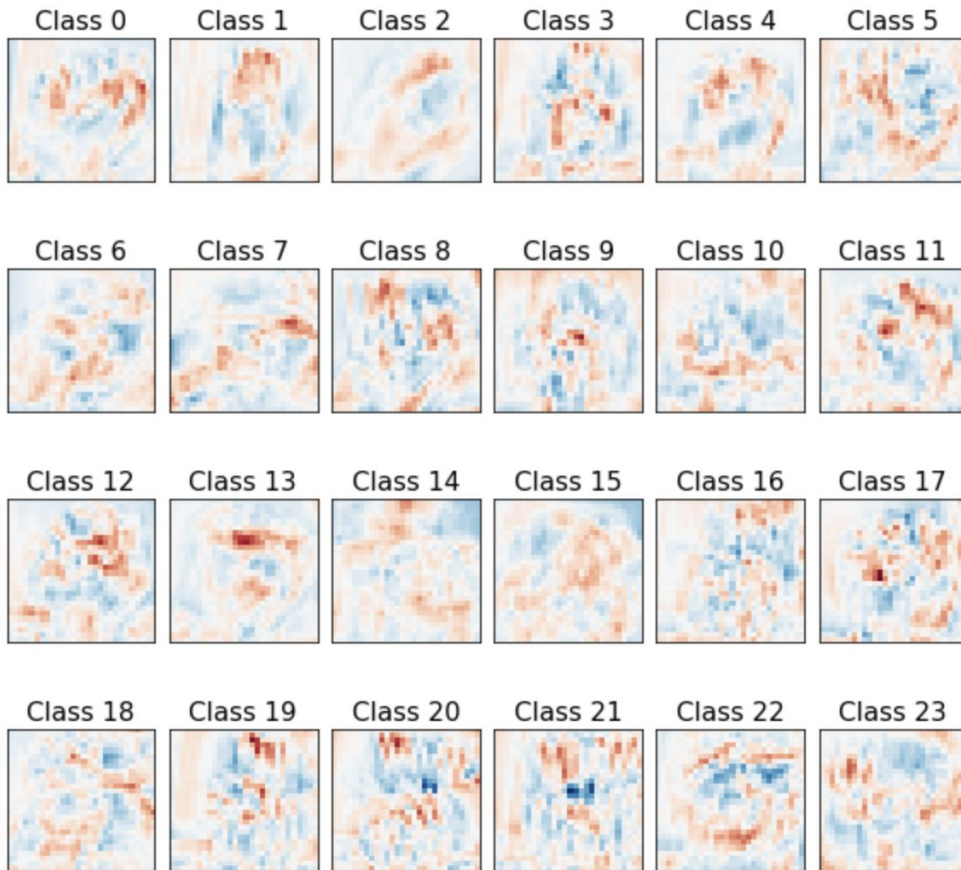
Actual 1



Predicted 20

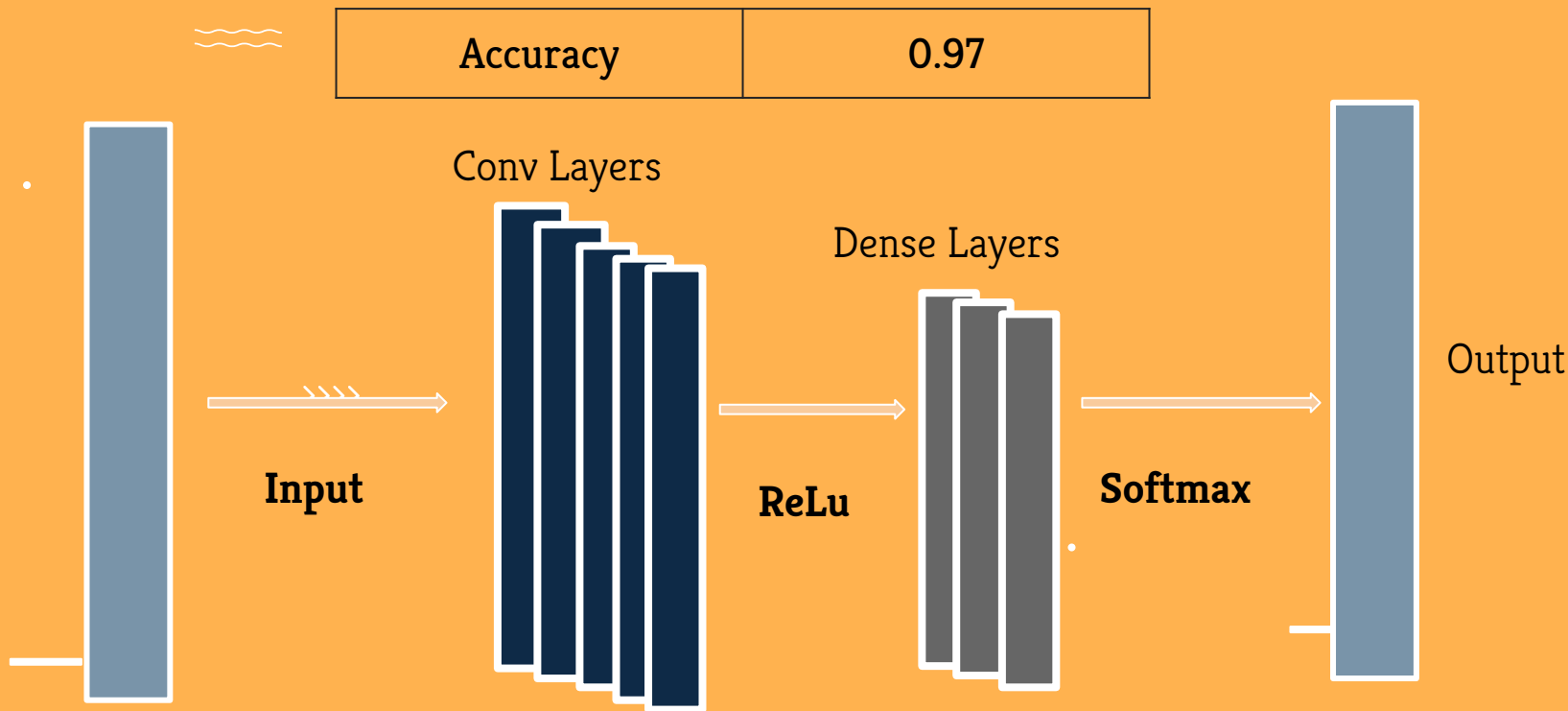


# Logistic Feature Importance



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# Convolutional Neural Net

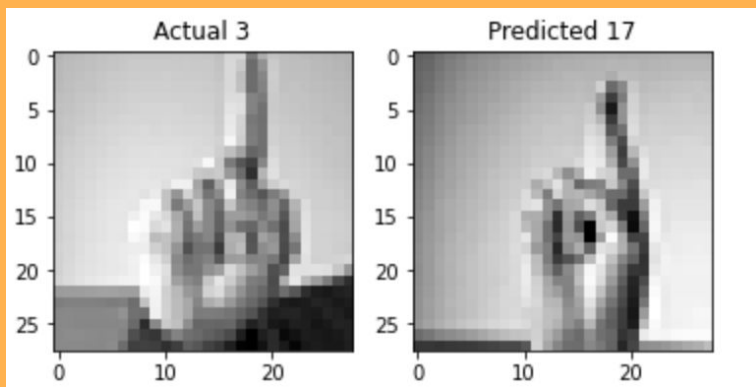
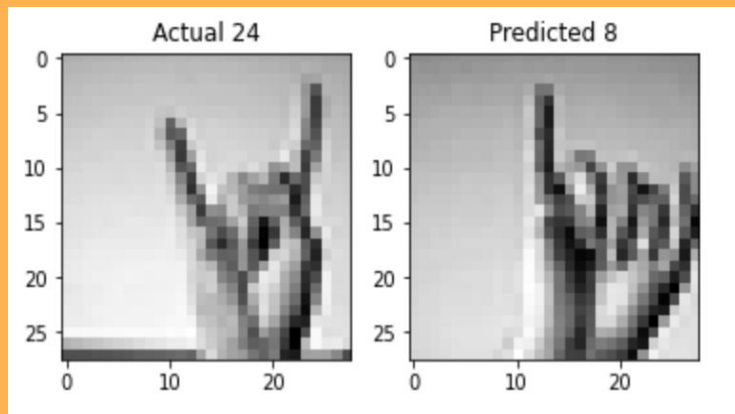




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# CNN Evaluation

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# Convolutional Neural Net with transfer learning

Accuracy	0.87
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Imagenet

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# Future Work

- Add more image data for alphabets
- Include ASL hand gestures such as numbers
- Deploy the model using Flask



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*Thank you*

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# Appendix 1

## Alphabets with numbers



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# Appendix 2

## Logistic Regression Confusion Matrix

Actual \ Predicted	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
0	330	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
1	0	387	0	23	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	22	0	0	0
2	0	0	287	0	0	21	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	0	0	0	222	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	20	0
4	0	0	0	0	435	0	0	0	0	0	0	0	0	0	0	0	0	0	0	63	0	0	0	0	0
5	0	0	21	0	0	226	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6	0	0	0	0	0	0	256	14	0	0	0	0	6	0	0	0	34	0	0	38	0	0	0	0	0
7	0	0	0	0	0	0	42	315	0	0	0	21	0	0	0	0	0	0	0	21	21	0	0	16	0
8	0	0	0	0	0	0	0	0	195	17	0	0	0	0	0	0	0	21	0	0	0	0	0	0	55
9	0	0	0	0	0	42	0	0	12	151	0	1	0	0	0	0	0	85	9	0	4	0	8	0	19
10	0	0	0	0	0	0	0	0	0	0	0	0	188	0	0	0	0	0	0	0	0	0	0	21	0
11	21	0	0	0	27	0	0	0	14	0	0	241	21	4	0	6	0	54	0	0	0	0	0	0	6
12	42	0	0	0	0	0	0	0	0	0	0	40	166	0	0	21	0	1	21	0	0	0	0	0	0
13	0	0	0	0	21	12	6	0	0	0	0	0	29	148	0	0	0	0	30	0	0	0	0	0	0
14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	332	15	0	0	0	0	0	0	0	0
15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	122	0	18	0	0	0	0	0	0
16	0	0	0	0	0	0	0	0	0	0	20	0	0	0	0	0	0	62	18	0	43	1	0	0	0
17	0	0	0	0	21	0	0	20	42	0	0	51	26	0	0	0	0	0	66	0	0	0	0	0	20
18	0	0	0	0	0	6	7	21	0	8	0	0	0	0	3	0	0	0	0	150	20	0	12	21	0
19	0	0	0	0	18	0	0	0	0	0	41	27	0	0	0	0	0	58	0	0	122	0	0	0	0
20	0	0	0	0	0	0	0	0	0	7	19	0	0	0	0	0	0	34	0	0	20	166	80	0	0
21	0	0	0	0	0	20	0	0	0	0	0	0	0	0	0	0	0	20	0	0	7	9	151	0	0
22	0	0	3	0	0	13	0	0	3	0	0	0	0	0	0	0	0	22	17	21	0	0	64	141	0
23	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	45	25	26	0	0	0	0	193
24	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24

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# Appendix 3

## Neural Network Confusion Matrix

