

Capstone

Sprint 2

ANKIT DHEENDSA



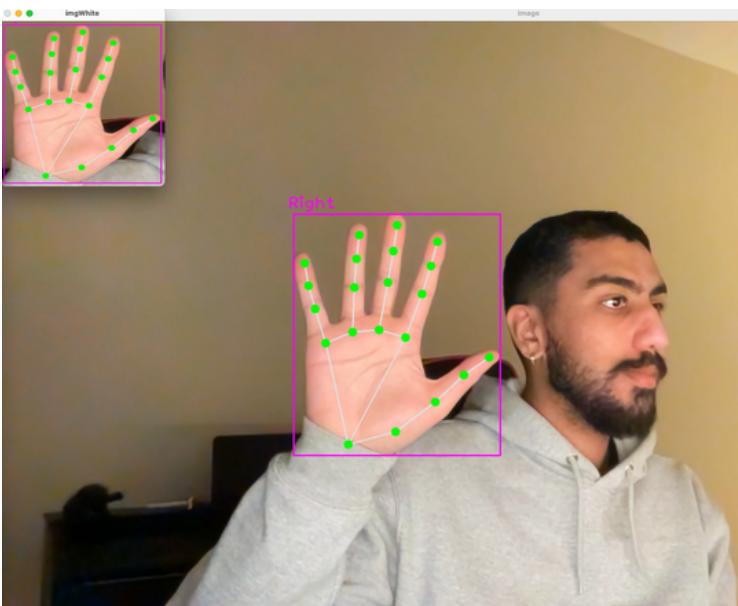
ASL Detection and Translation

Bridging the gap in communication caused by mutism

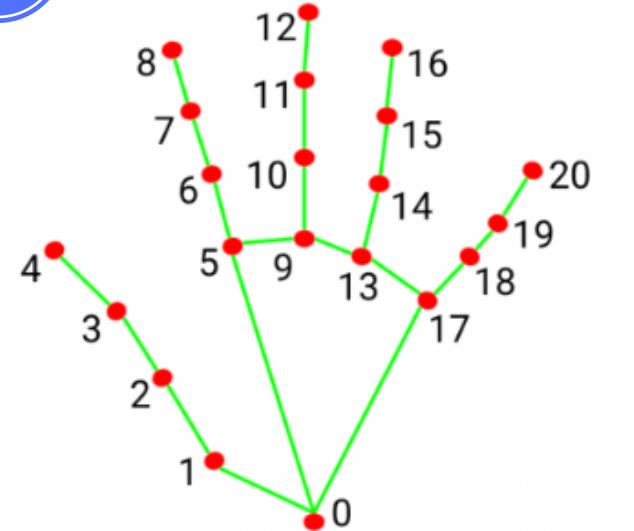
Total number of video conference/communication software that natively supports ASL translation = 0

Data Collection and Understanding

1



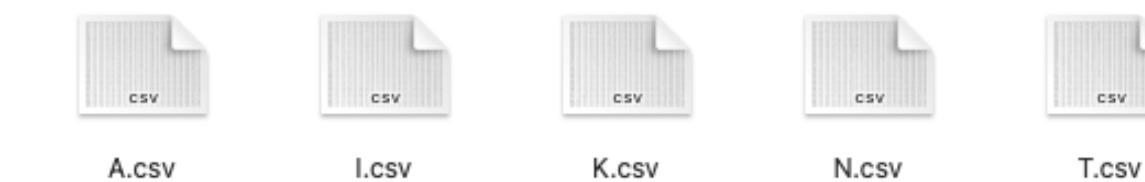
2



- 0. WRIST
- 1. THUMB_CMC
- 2. THUMB_MCP
- 3. THUMB_IP
- 4. THUMB_TIP
- 5. INDEX_FINGER_MCP
- 6. INDEX_FINGER_PIP
- 7. INDEX_FINGER_DIP
- 8. INDEX_FINGER_TIP
- 9. MIDDLE_FINGER_MCP
- 10. MIDDLE_FINGER_PIP
- 11. MIDDLE_FINGER_DIP
- 12. MIDDLE_FINGER_TIP
- 13. RING_FINGER_MCP
- 14. RING_FINGER_PIP
- 15. RING_FINGER_DIP
- 16. RING_FINGER_TIP
- 17. PINKY_MCP
- 18. PINKY_PIP
- 19. PINKY_DIP
- 20. PINKY_TIP

3

Image	Landmark 0_X	Landmark 1_X	Landmark 2_X	Landmark 3_X	Landmark 4_X	Landmark 5_X
Image_1	538	616	594	612	642	580
Image_2	528	616	581	609	628	574
Image_3	527	620	578	607	622	571
Image_4	528	619	572	609	619	569
Landmark 0_Y	Landmark 1_Y	Landmark 2_Y	Landmark 3_Y	Landmark 4_Y	Landmark 5_Y	
492	643	511	630	531	610	
483	609	515	608	530	596	
475	600	507	599	521	588	
474	589	515	599	522	586	



Statistical Analysis

1

Statistics for DataFrame: CSV/A.csv
=====

Landmark 0 X,Y:
Mean: 547.72, 517.70
Median: 546.00, 521.00
Standard Deviation: 28.48, 23.04

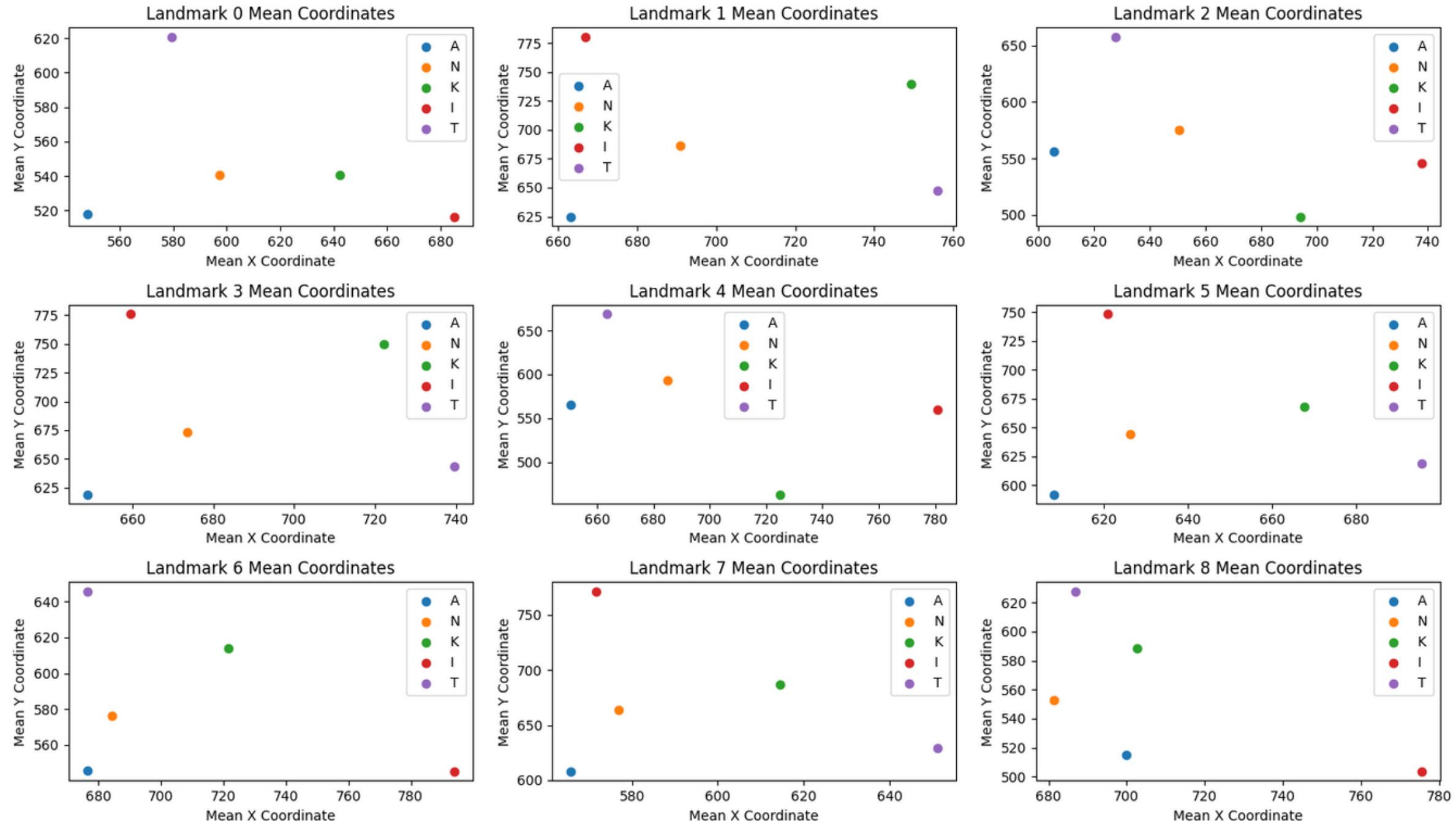
Landmark 1 X,Y:
Mean: 663.13, 624.55
Median: 668.00, 620.00
Standard Deviation: 24.43, 32.52

Landmark 2 X,Y:
Mean: 605.64, 555.86
Median: 604.00, 562.00
Standard Deviation: 29.29, 24.75

Landmark 3 X,Y:
Mean: 648.73, 619.03
Median: 652.00, 615.00
Standard Deviation: 21.44, 30.63

Landmark 4 X,Y:
Mean: 650.59, 564.77
Median: 648.00, 569.00
Standard Deviation: 28.89, 22.68

2

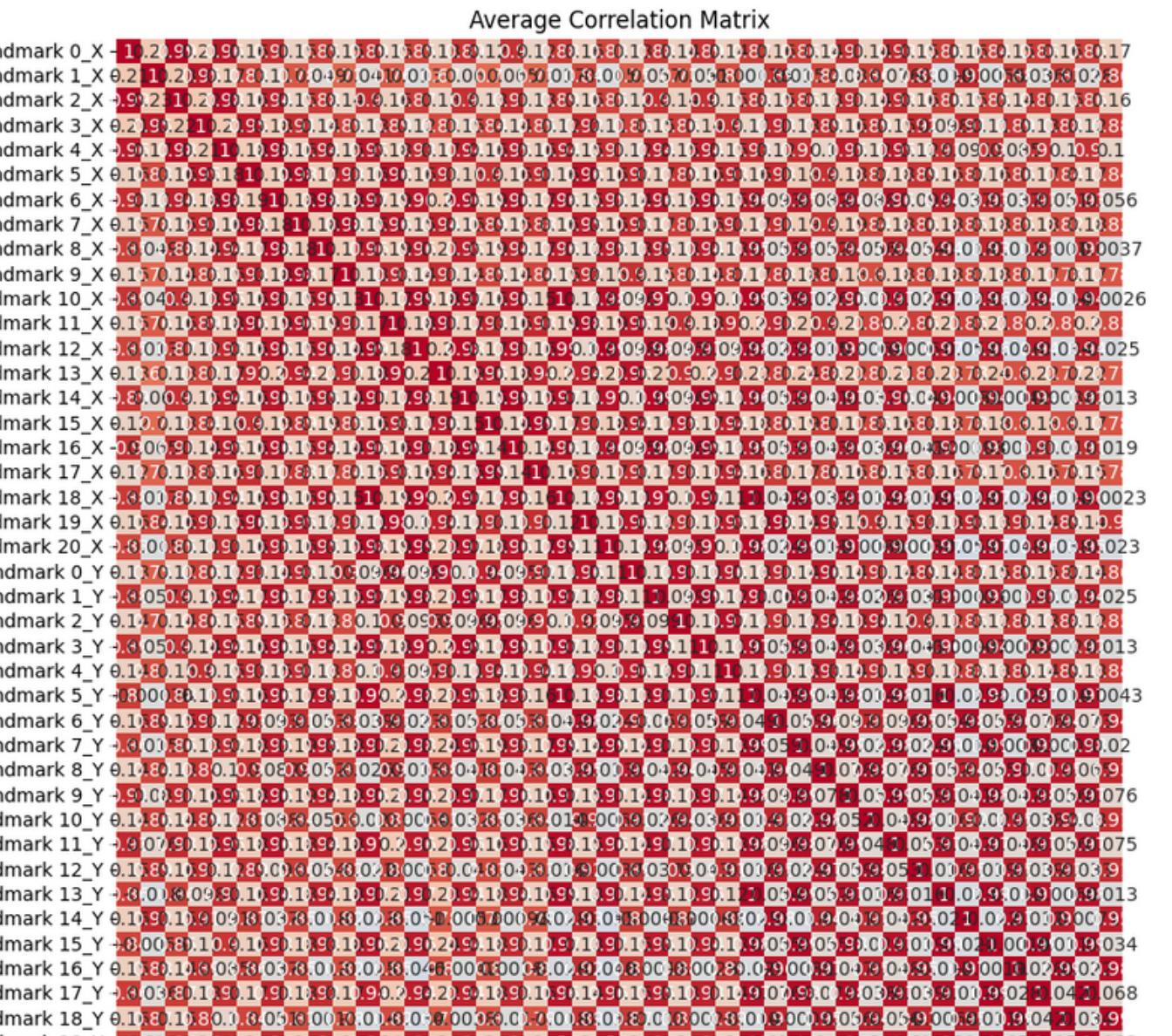


Correlation Analysis

1

Correlation Matrix for DataFrame: A		
	Landmark 0_X	Landmark 1_X
Landmark 0_X	1.000000	0.135381
Landmark 1_X	0.135381	1.000000
Landmark 2_X	0.979227	0.167910
Landmark 3_X	0.077127	0.932213
Landmark 4_X	0.946027	0.071762
Landmark 5_X	-0.038645	0.764030
Landmark 6_X	0.886775	-0.055322
Landmark 7_X	-0.023261	0.626461
Landmark 8_X	0.809015	-0.141506
Landmark 9_X	-0.036710	0.445655
Landmark 10_X	0.871583	-0.104205
Landmark 11_X	-0.027486	0.697867
Landmark 12_X	0.821643	-0.159341
Landmark 13_X	-0.053341	0.590407
Landmark 14_X	0.885294	-0.086470
Landmark 15_X	-0.104323	0.715338
Landmark 16_X	0.906545	-0.068033
Landmark 17_X	-0.065053	0.769259
Landmark 18_X	0.855984	-0.139861
Landmark 19_X	-0.014391	0.795107
Landmark 20_X	0.823725	-0.153083
Landmark 0_Y	-0.049054	0.693304
Landmark 1_Y	0.900068	-0.047307

2

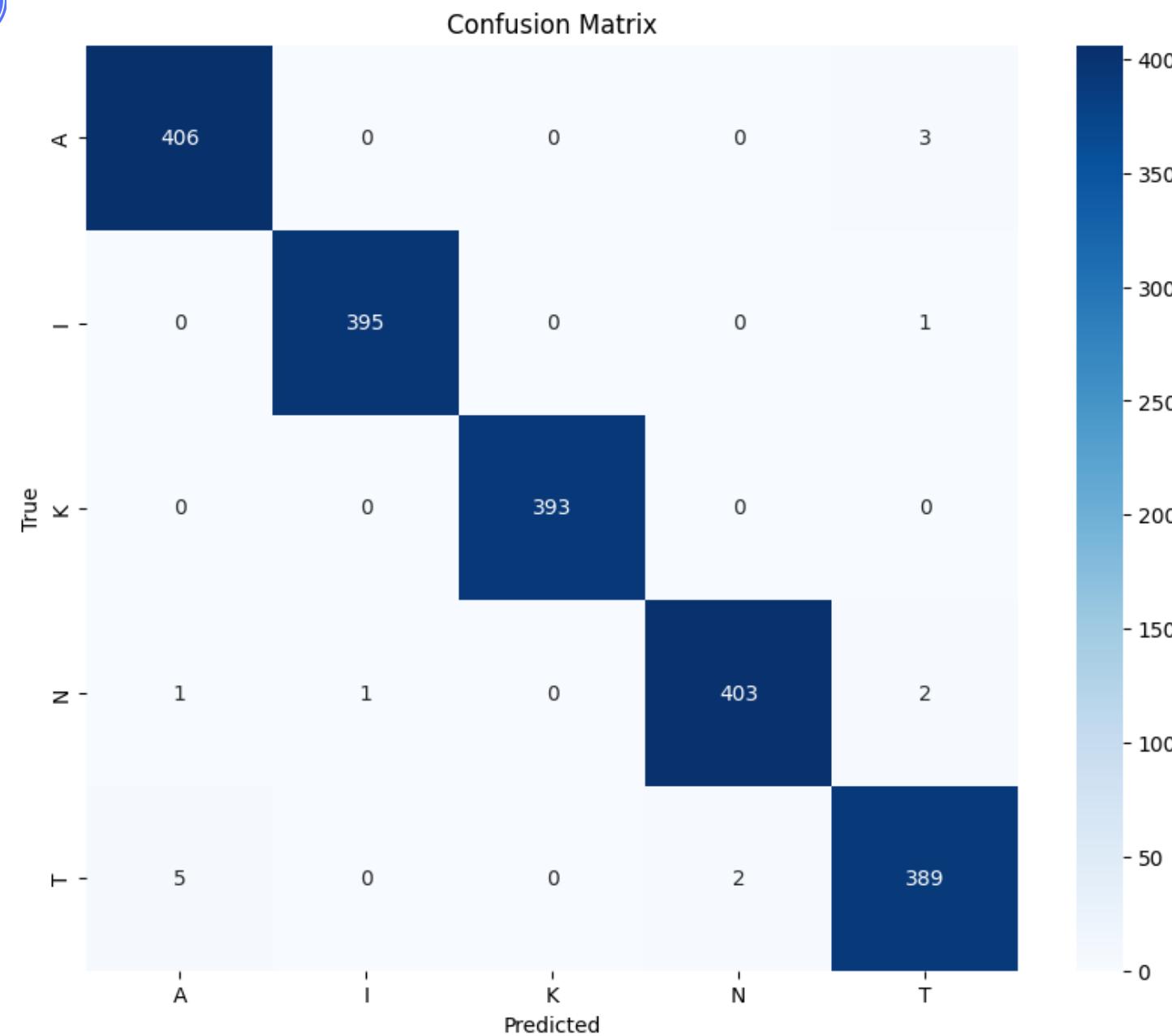


Logistic Regression and Confusion Matrix

1

Classification Report:				
	precision	recall	f1-score	support
A	0.99	0.99	0.99	409
I	1.00	1.00	1.00	396
K	1.00	1.00	1.00	393
N	1.00	0.99	0.99	407
T	0.98	0.98	0.98	396
accuracy			0.99	2001
macro avg	0.99	0.99	0.99	2001
weighted avg	0.99	0.99	0.99	2001

2



Next Steps



Increasing Dataset

- Increasing the number of pictures for each symbol to 5k
- Introducing "my" and "name" hand signs

Build → Train → Evaluate → Present

- Construct and train CNN on refined data sets
- Evaluate accuracy results
- Create demo video