UF Herbert Wertheim College of Engineering
UNIVERSITY of FLORIDA

ASL ML Classifier

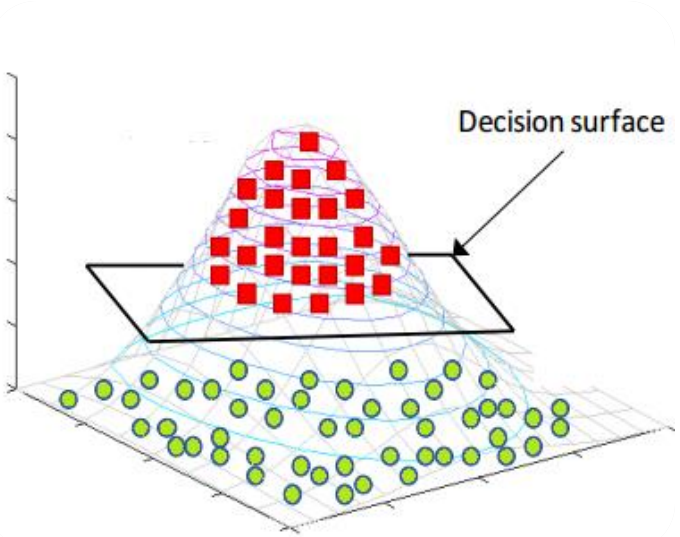
Machine Earning

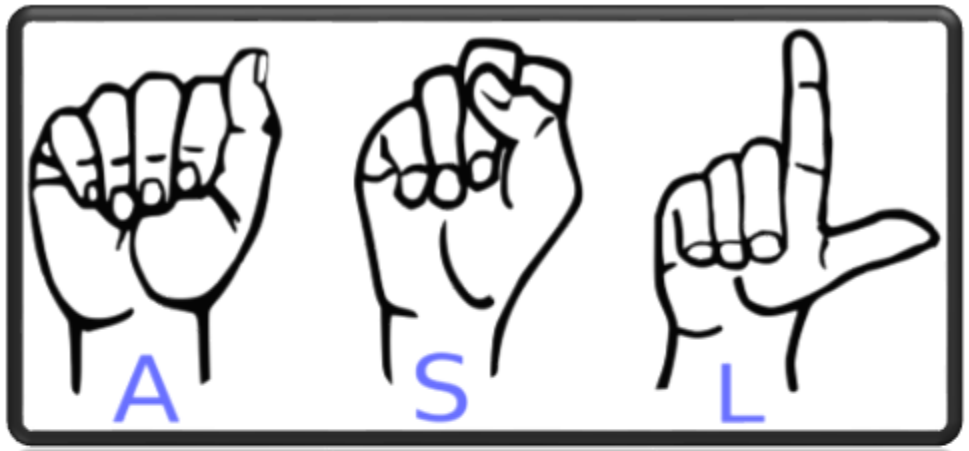
April 20, 2020

Meet the Team

Member	Studying	Year	Graduating?
Connor Dupuis	CE	3rd	No
Max Gazeroglu	EE	4th	No
Brian Ho	CE	5th	Yes
Aaron Sager	ME, EE minor	5th	Yes

Problem Statement





		Predicted Class: P	Predicted Class: N
Actual Class	P	True Positives (TP)	False Negatives (FN)
	N	False Positives (FP)	True Negatives (TN)

Create a machine learning model to classify images of American Sign Language letters A through I, achieving the highest accuracy possible.

External Research / Literature Review

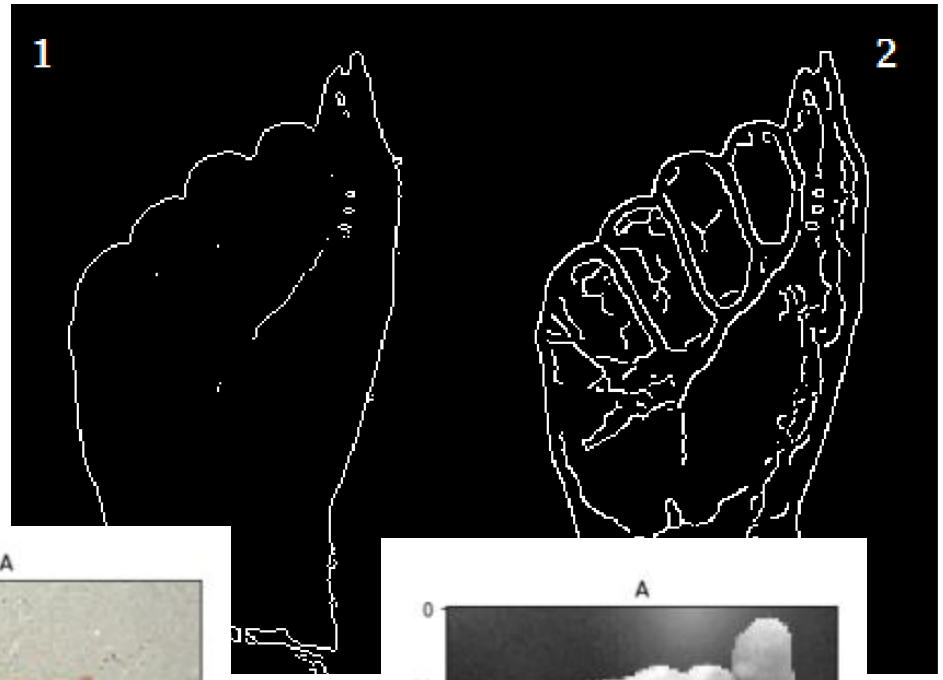
- CNN used 50,000 images [1]
- SVM > MLP [2]
- Threshold images [3]

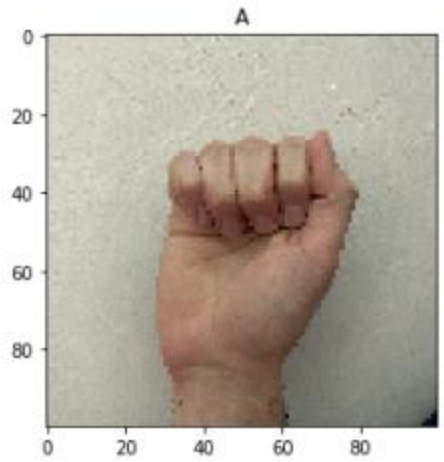
Fig.2. Input image

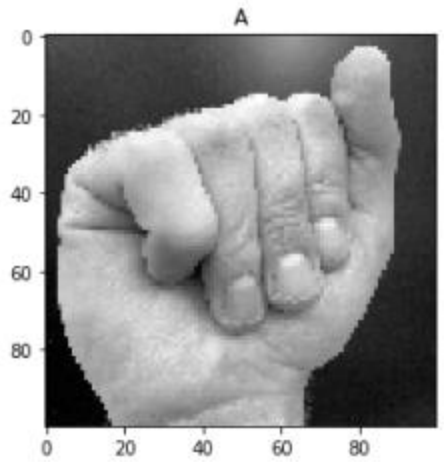
Fig.3. Threshold image

Implementation

- Scikit-Learn
- 100x100 pixels
- Confidence guessing "–1"







Experimentation – Initial Experiments

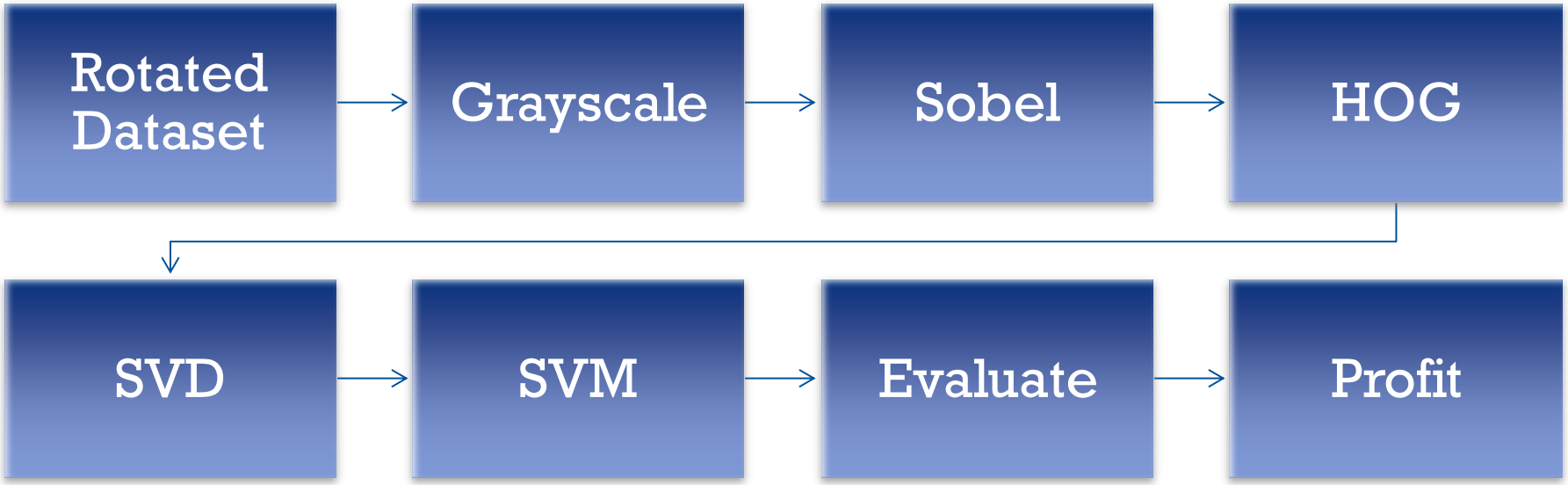
- SVM, K-Nearest Neighbors (KNN), Random Forest,

LDA, MLP, and decision tree

Summary Table of Classifiers

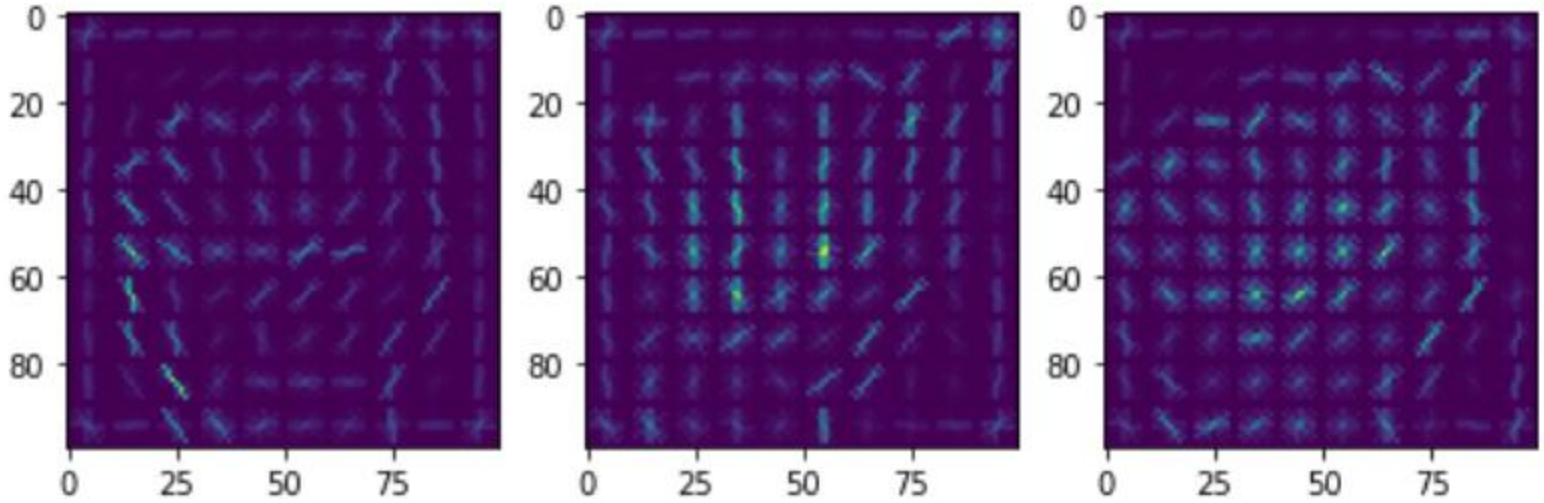
Classifier	Training Accuracy	Testing Accuracy
SVM	1.0	0.83
KNN	1.0	0.81
MLP	0.86	0.61
Random Forest	0.99	0.57
LDA	0.67	0.53
Decision Tree	1.0	0.44

Final Pipeline



Experimentation – Feature Extraction/Generation & Data

- Rotated Images
- HOG
- Sobel
- SVD
- Kaggle



Experiments

- Standardization problems
- Sobel vs Roberts
- SVD vs Others
- Predict vs Probability

Conclusion

- 100% Test Accuracy
- Image Rotations, Sobel, HOG, and SVM

References

- [1] Daroya, Rangel & Peralta, Daryl & Naval, Prospero. (2018). Alphabet Sign Language Image Classification Using Deep Learning. 0646-0650. 10.1109/TENCON.2018.8650241. Available: https://www.researchgate.net/publication/331854265_Alphabet_Sign_Language_Image_Classification_Using_Deep_Learning
- [2] M. Ugale, S. Bende, M. Haldankar, S. Hedge, “ASL Fingerspelling Interpretation Using SVM and MLP,” International Research Journal of Engineering and Technology, vol. 5, no. 3, Mar. 2018. Available: https://www.irjet.net/archives/V5/i3/IRJET-V5I3410.pdf
- [3] D. Mali, N. Limkar, S. Mali, “Indian Sign Language Recognition using SVM Classifier,” International Conference on Communication and Information Processing, 2019. Available: https://poseidon01.ssrn.com/delivery.php?ID=282093115122109089124118098015088069019088031054017090087071080000084099066003070103023026019052022005116112112081110065114109011066028011020097082116117092116080088086013051126064098000004089124081119003080030072073089084094002024113074020096065095125&EXT=pdf

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Questions?

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