Trials	1	2
Data Augmentation		
Process	1. Original image was mirrored to generate left and right 2. Pose features were extracted from the images	1. Synthetic data points were generated using Rotation Matrix Transformation
Results	2 Data points per class	72 data points per unique class
Feature Engineering		
Feature Creation	Angles and distances features were computed in a 2D space.	No changes
Dimensionality Reduction (Feature Selection)	Raw and added features were selected. (Xr)	Augmented and added features were selected. (Xa)
Feature Validation		
K-fold Cross Validation Accuracy	Optimal K (Xr_v1): 1 - Maximum Accuracy: 0.0441 Optimal K (Xr_v2): 1 - Maximum Accuracy: 0.0423	Optimal K (Xr): 1 - Maximum Accuracy: 0.0441 Optimal K (Xa): 1 - Maximum Accuracy: 0.6668
Principal Component Analysis	Eigen values remain less than 1 (Kaiser rule) 6-8 components reaches 80% variance	Eigen values remain less than 1 (Kaiser rule) 3-4 Components that reaches 80% variance
Linear Discriminant Analysis	Not recommended due to low data points per unique class	Xa: 32/128 features are found to be discriminant; however contained multiple features in the same region (eyes, mouth, etc.)
KNN Classification	Model accuracy is too low for meaninful KNN classification test.	Overall, the model is able to classify the main theme of the test category, however it fails to accurately describe transitional poses. Some predicted labels also look similar to the expected one.
Test Category: Superman	-	Manual selection (all) outperformed LDA-reduced selection in all test cases.
Test Category: Crucifix	-	Manual selection (all) outperformed LDA-reduced selection in all test cases.
Test Category: Fireman	-	Manual selection (all) outperformed LDA-reduced selection in all test cases.
Additional Notes and Action Points	The overall low accuracy can be attributed to the poor quality of the dataset. Although adding features yielded a slight improvement in accuracy, the difference was minimal. Employing synthetic data reconstruction could potentially address these issues.	1. The data augmentation method is effective but introduces significant noise. Considering computation in 3D space might enhance clarity. 2. The LDA model's coefficients highlight the head region as significantly discriminant, which contradicts domain knowledge indicating that pole poses are primarily differentiated by limb positions, not facial features. To align with this understanding, the feature set should be manually curated to focus on limb-related attributes, ensuring more relevant and accurate pose classification. 3. The LDA-reduced feature set is overly condensed, leading to information loss. Despite the KNN model's ability to accurately identify labels, the dataset's homogeneity means a single pose could correspond to two valid labels, causing a division in true label identification.

3
No changes
No changes
Angle and distance features were computed in a 3D space. (Same with the test category)
Xa: Improved augmented dataset with added features Xs: Landmarks 1-10, associated with the eye and mouth regions; landmarks 17-22, related to the fingers and thumbs; and landmarks 29-32, covering the toes and foot soles, were omitted. Xf: Only added features were selected
Optimal K (Xa): 1 - Max Accuracy: 0.7610 Optimal K (Xs): 1 - Max Accuracy: 0.8668 Optimal K (Xf): 1 - Max Accuracy: 0.9632
Eigen values remain less than 1 (Kaiser rule) Xa: 2-3 components that reaches 80% variance Xs: 2-3 components that reaches 80% variance Xf: 2-3 components that reaches 80% variance
Xa: 31 / 128 features are discriminant Xs: 12 / 65 features are discriminant Xf: 4 / 29 features are discriminant