

BIOMARKER

ANALYSIS REPORT

Comprehensive Analysis Results

Comparing: AD vs Control

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1. Analysis Summary

Dataset Filename: GSE120584_serum_norm_demo.csv

AD vs Control

Analysis 1

Analysis Date: 24/07/2025, 05:31:12

Analysis Types: Differential: SHAP

Execution Time: 36 secs

Analysis 2

Analysis Date: 24/07/2025, 05:31:57

Analysis Types: Differential: LIME

Execution Time: 29 secs

Analysis 3

Analysis Date: 24/07/2025, 05:32:16

Analysis Types: Differential: Anova

Execution Time: 6 secs

Analysis 4

Analysis Date: 24/07/2025, 05:32:35

Analysis Types: Differential: T_test

Execution Time: 6 secs

Analysis 5

Analysis Date: 24/07/2025, 05:32:55

Analysis Types: Clustering: PCA

Execution Time: 9 secs

Analysis 6

Analysis Date: 24/07/2025, 05:33:18

Analysis Types: Clustering: tSNE

Execution Time: 10 secs

Analysis 7

Analysis Date: 24/07/2025, 05:33:47

Analysis Types: Clustering: UMAP

Execution Time: 15 secs

Analysis 8

Analysis Date: 24/07/2025, 05:34:13

Analysis Types: Classification: Logistic Regression

Execution Time: 6 secs

Analysis 9

Analysis Date: 24/07/2025, 05:34:32

Analysis Types: Classification: Random Forest

Execution Time: 8 secs

Analysis 10

Analysis Date: 24/07/2025, 05:36:05

Analysis Types: Classification: Decision Tree

Execution Time: 8 secs

Analysis 11

Analysis Date: 24/07/2025, 05:36:30

Analysis Types: Classification: Gradient Boosting

Execution Time: 11 secs

Analysis 12

Analysis Date: 24/07/2025, 05:38:02

Analysis Types: Classification: AdaBoost Classifier

Execution Time: 10 secs

Analysis 13

Analysis Date: 24/07/2025, 05:38:25

Analysis Types: Classification: MLPClassifier

Execution Time: 9 secs

Analysis 14

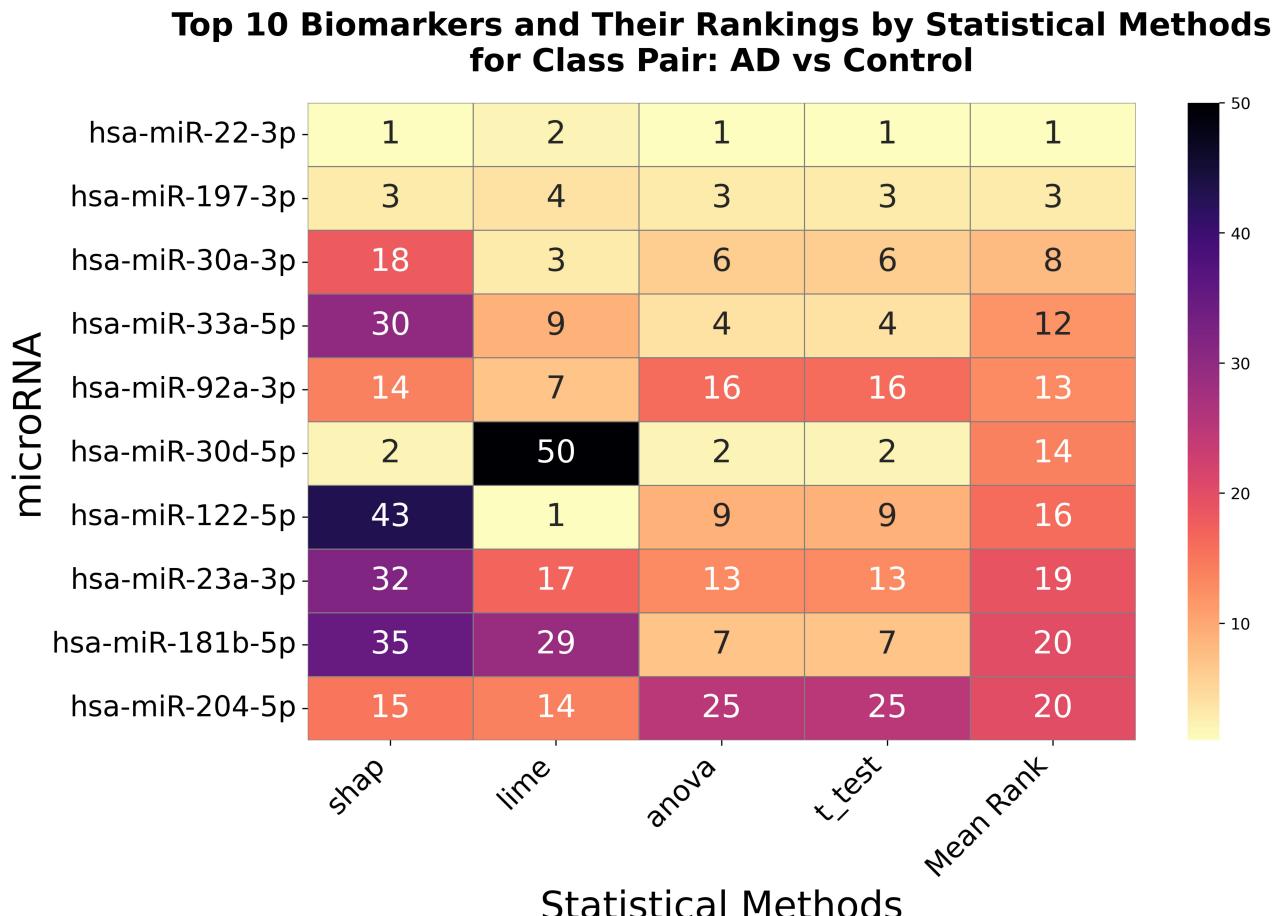
Analysis Date: 24/07/2025, 05:38:45

Analysis Types: Classification: SVC

Execution Time: 7 secs

2. Statistical Method Results

Summary for: AD vs Control



3. Analysis Results

AD vs Control

Analysis 1 for AD vs Control

shap waterfall subplots AD and Control

Waterfall Plots for AD and Control Samples



forceplot for AD sample

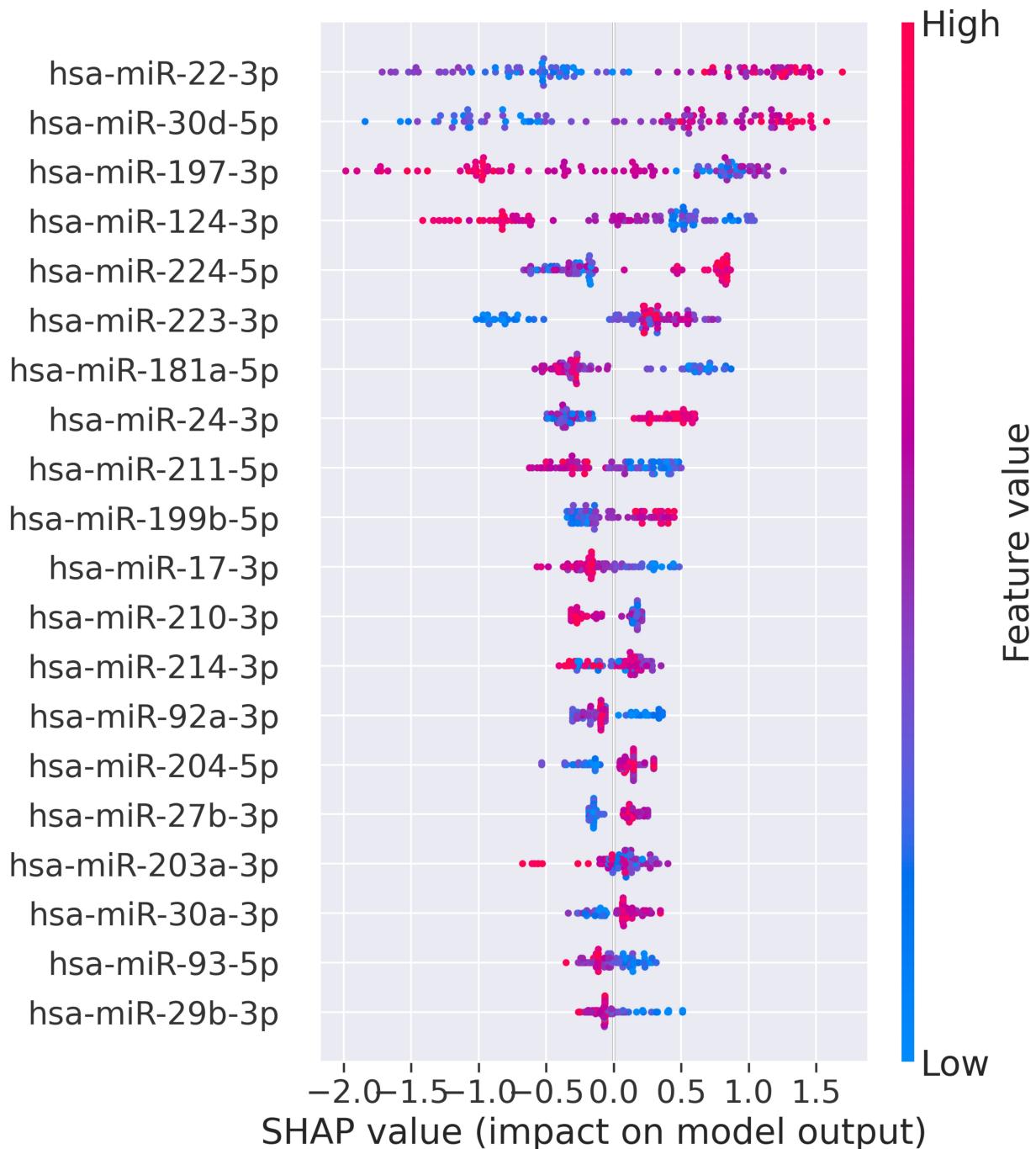


forceplot for Control sample

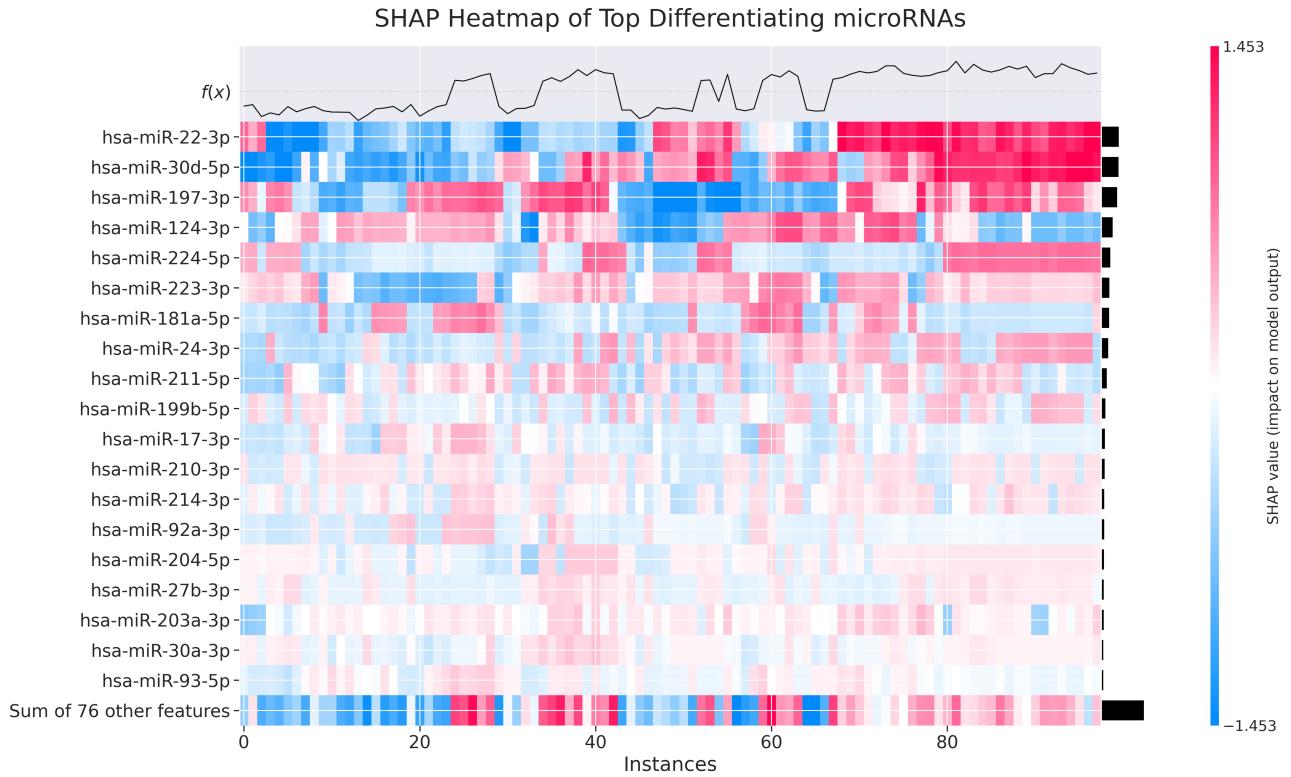


shap summary plot AD and Control

SHAP Summary Plot of Top Differentiating microRNAs



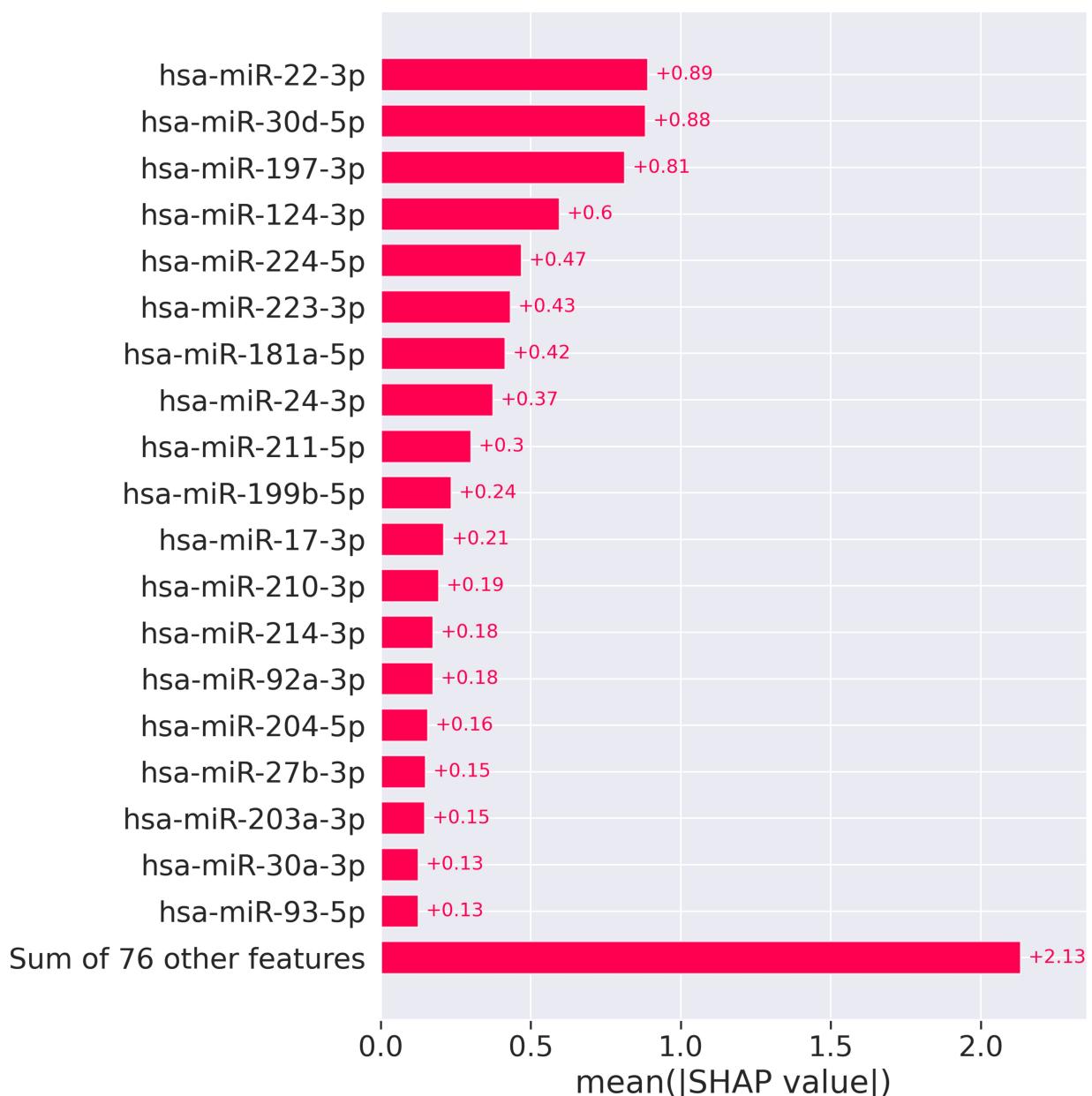
shap heatmap plot AD and Control



mean shap plot AD and Control

mean shap plot AD and Control (Continued)

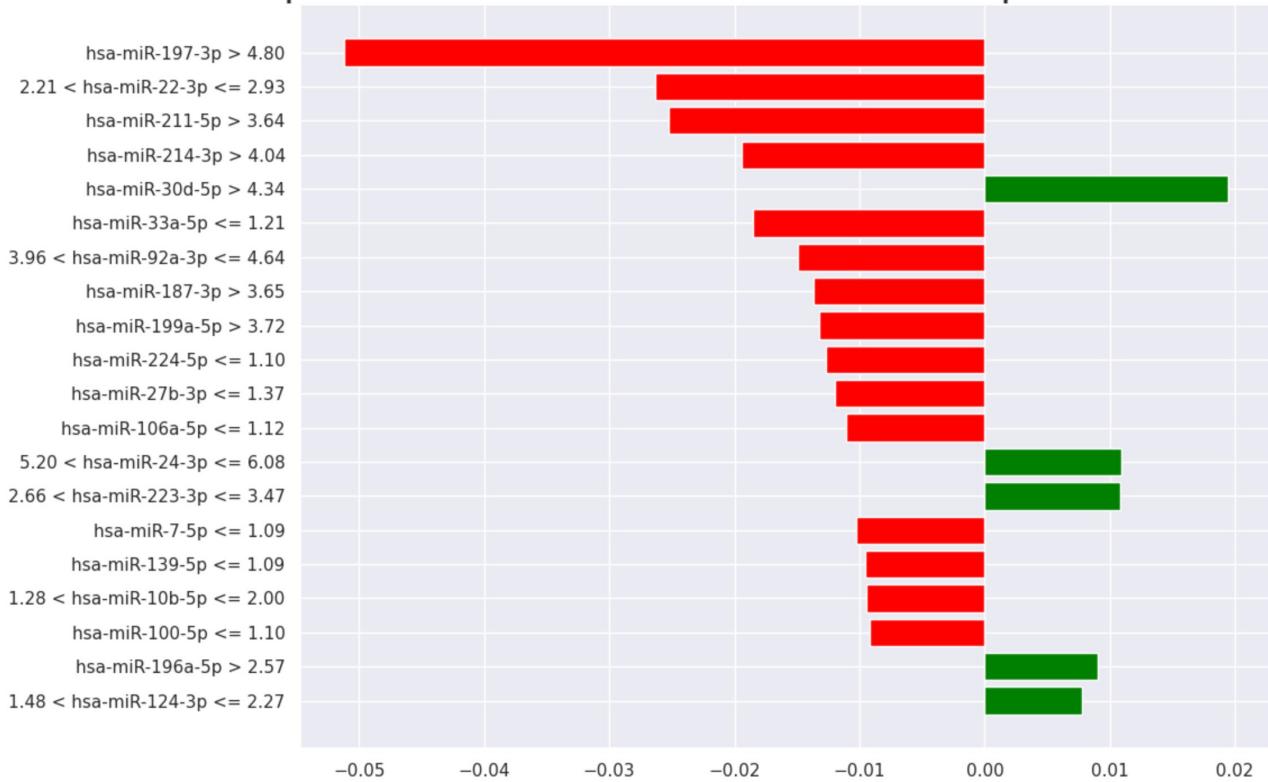
Mean SHAP Plot of Top Differentiating microRNAs



Analysis 2 for AD vs Control

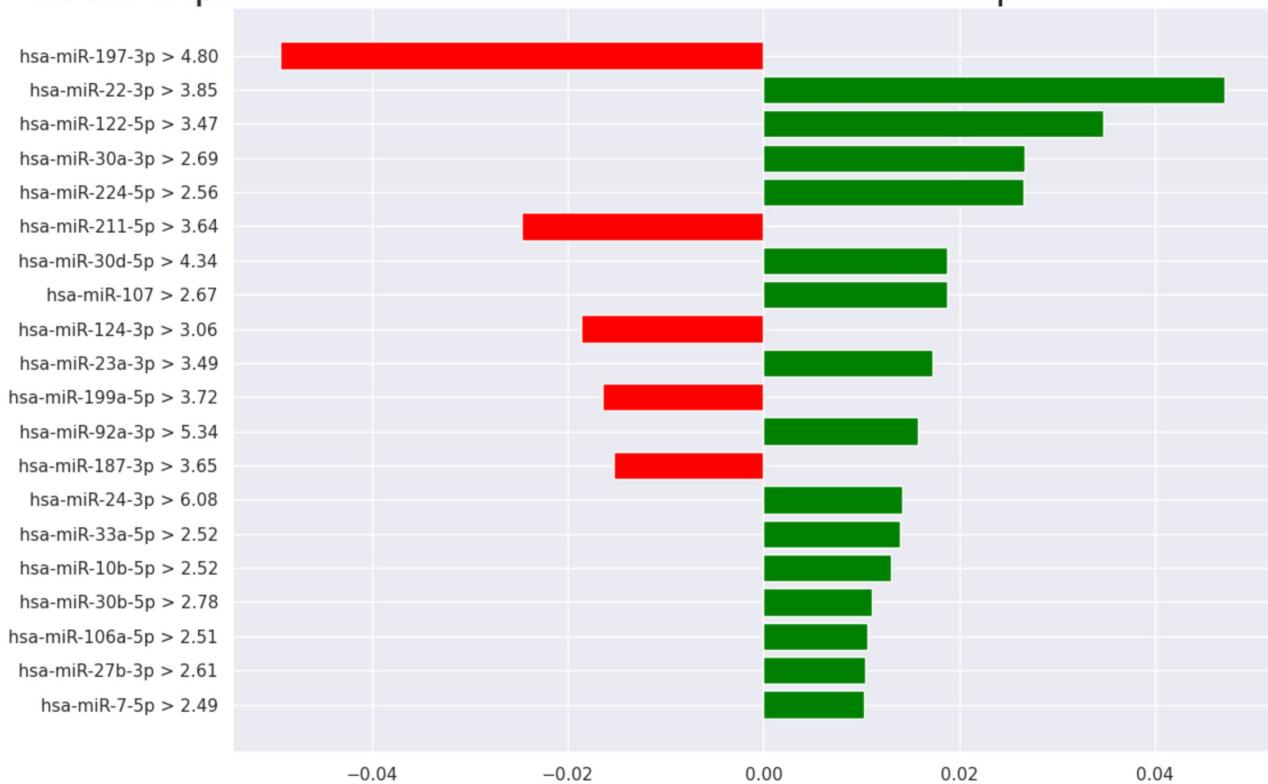
lime local explanation plot AD

Local explanation for class AD on an AD Sample



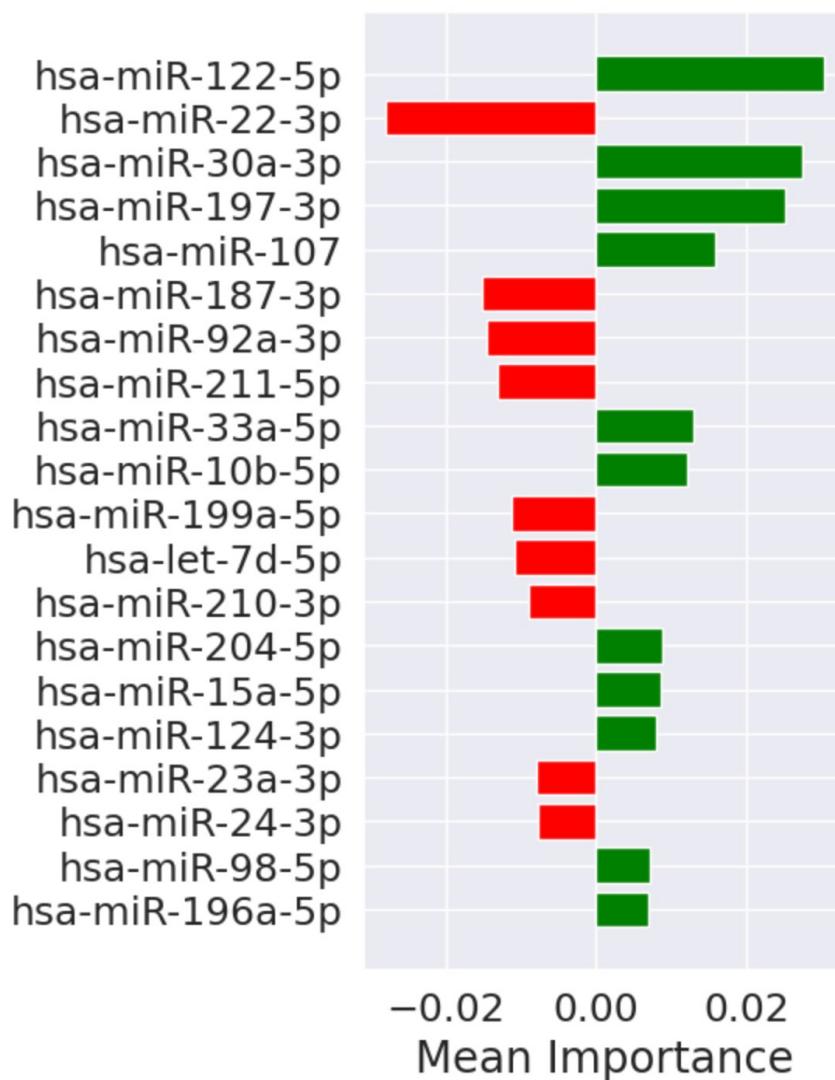
lime local explanation plot Control

Local explanation for class AD on an Control Sample



lime summary plot

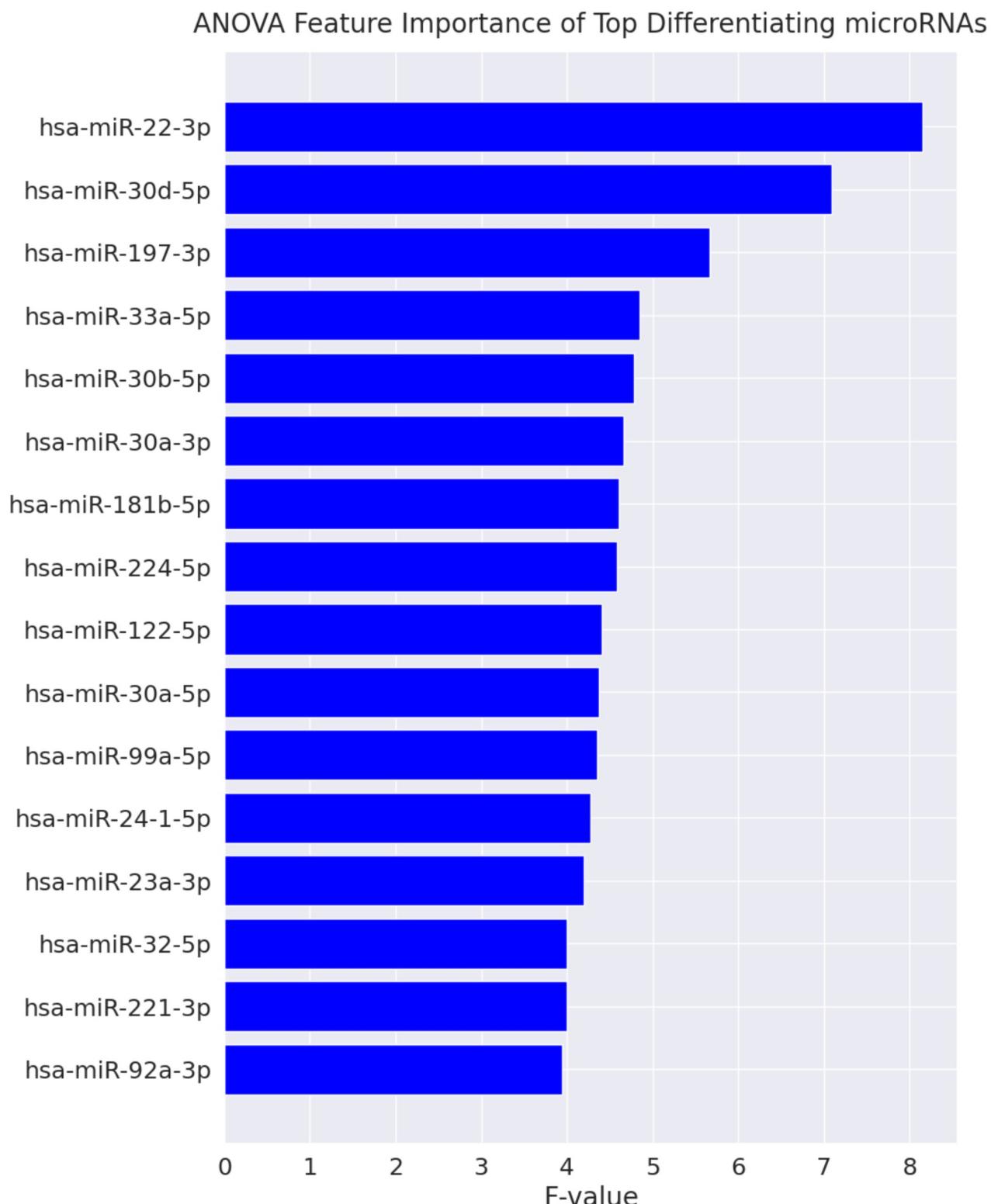
LIME Feature Importance of Top Differentiating microRNAs



Analysis 3 for AD vs Control

anova features plot

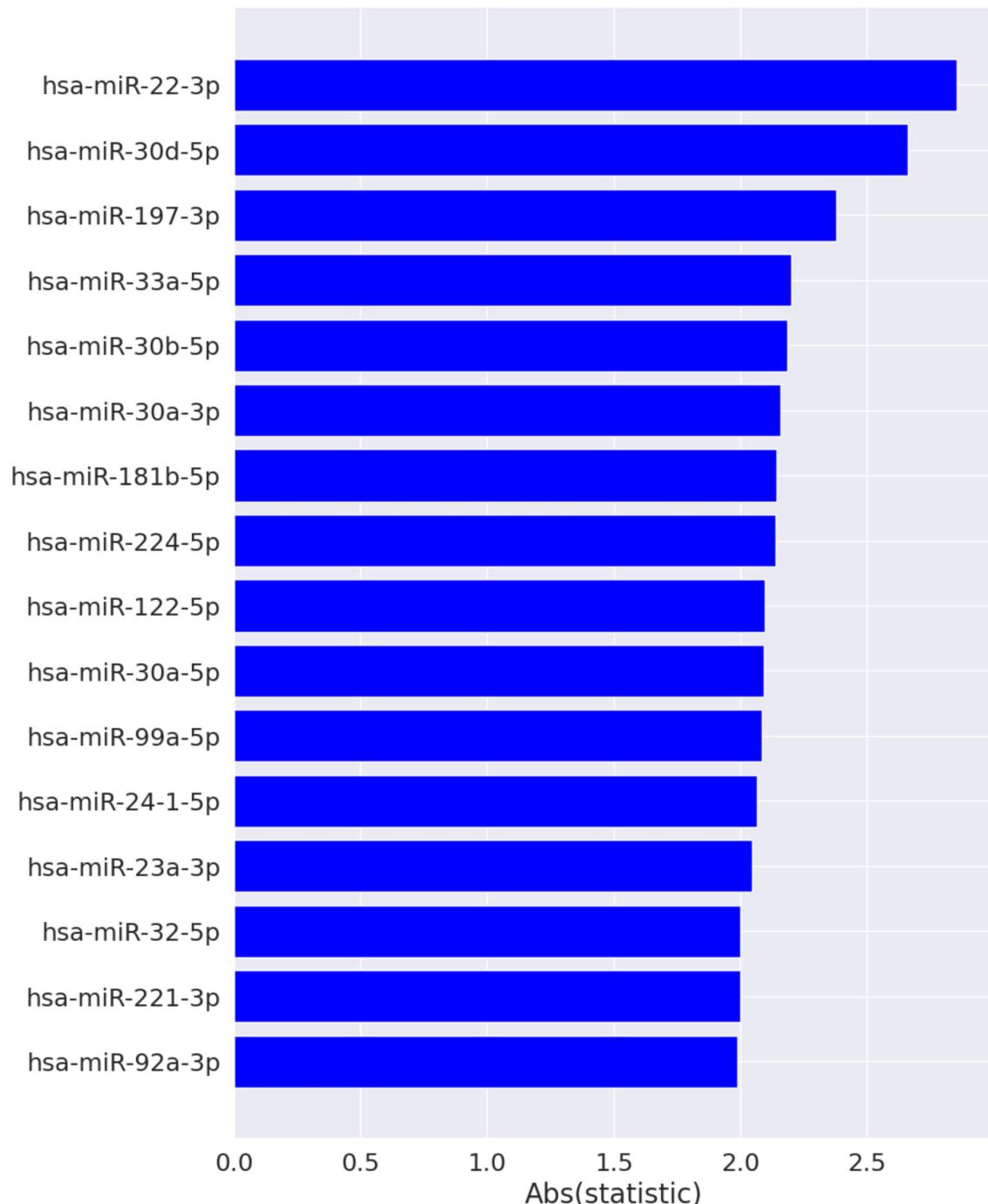
anova features plot (Continued)



Analysis 4 for AD vs Control

t test features plot

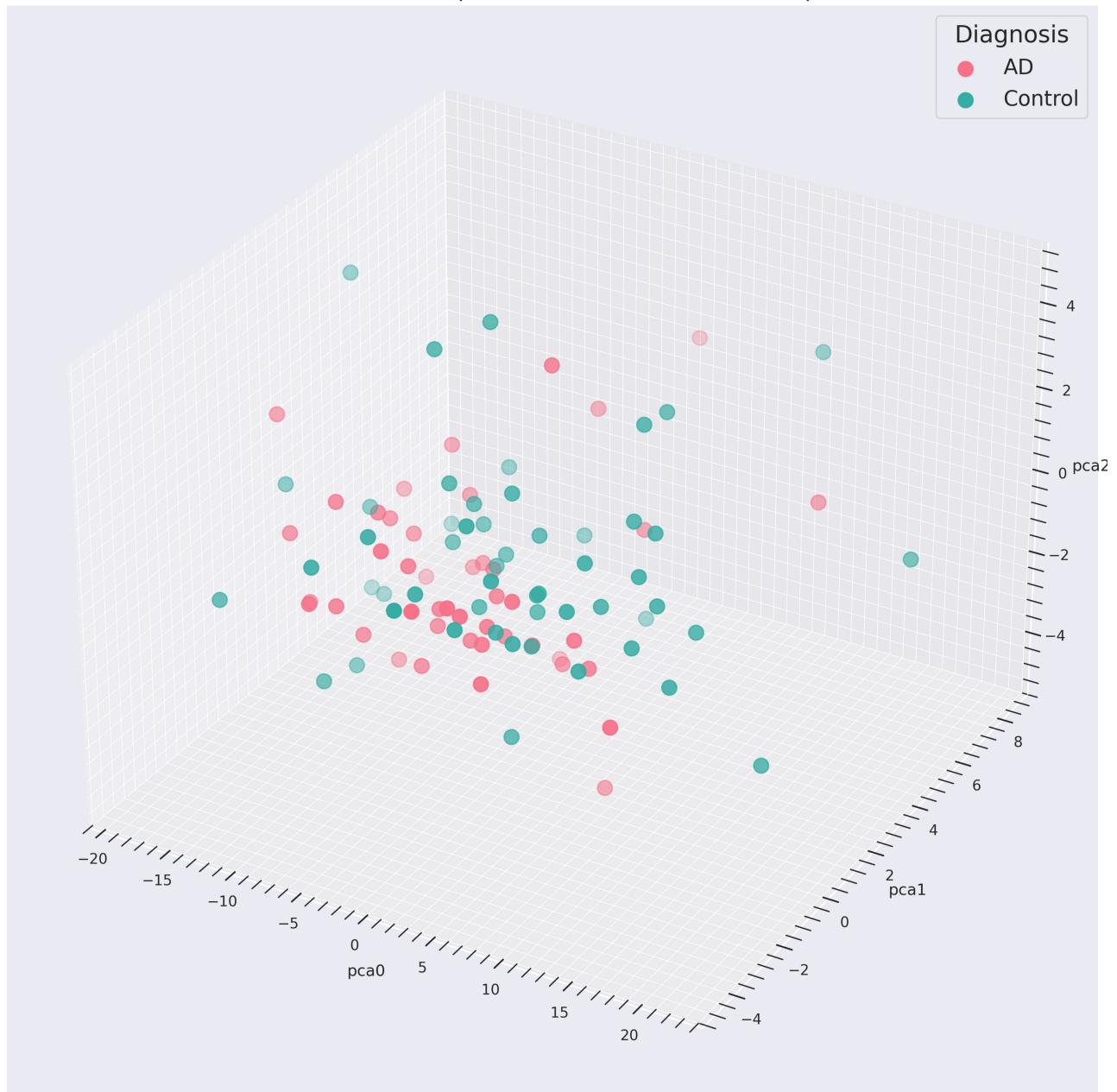
t-Test Feature Importance of Top Differentiating microRNAs



Analysis 5 for AD vs Control

3D pca plot (All Features)

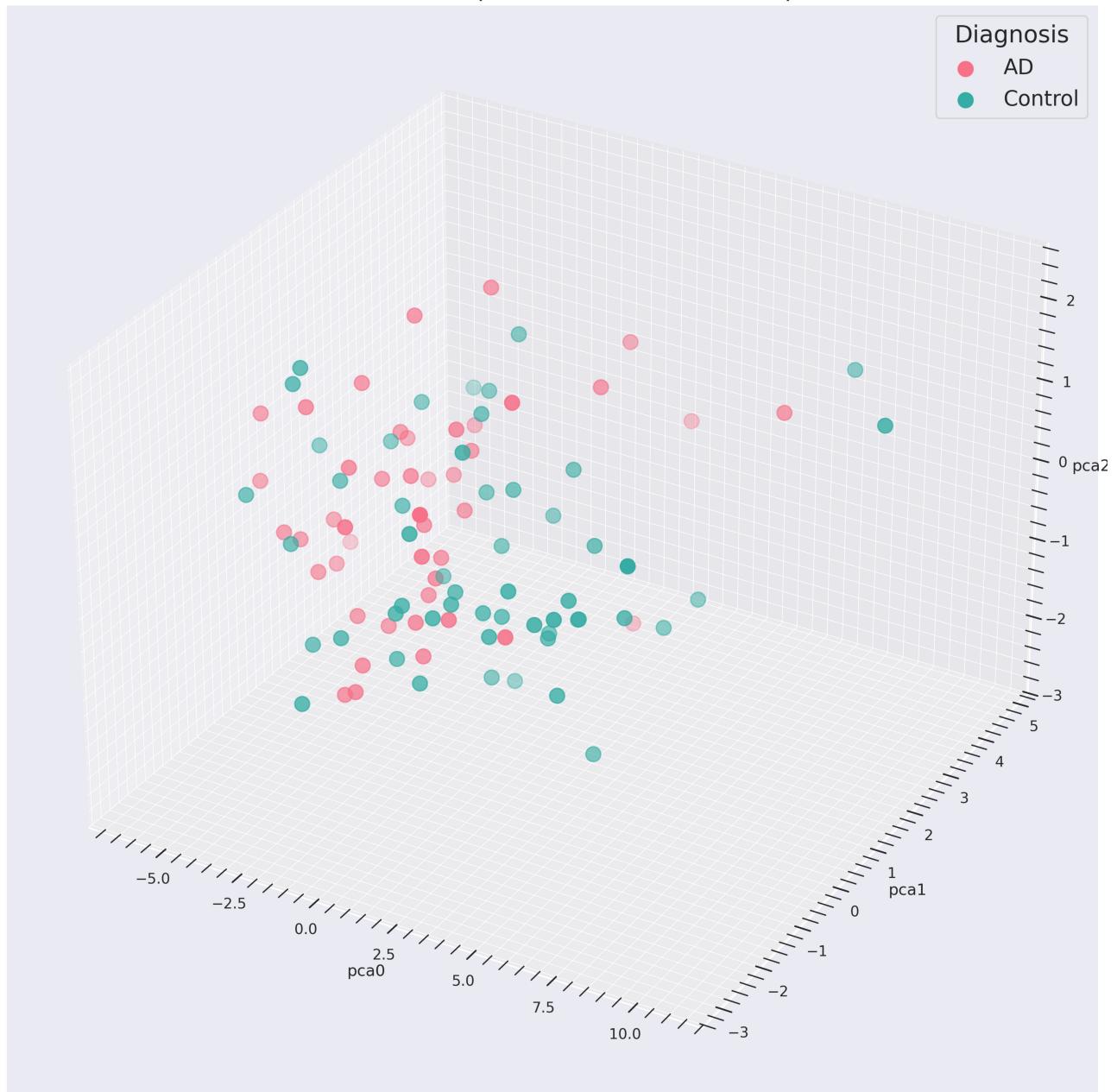
3D PCA Plot (Without Feature Selection)



3D pca plot (Selected Top-20 Features)

3D pca plot (Selected Top-20 Features) (Continued)

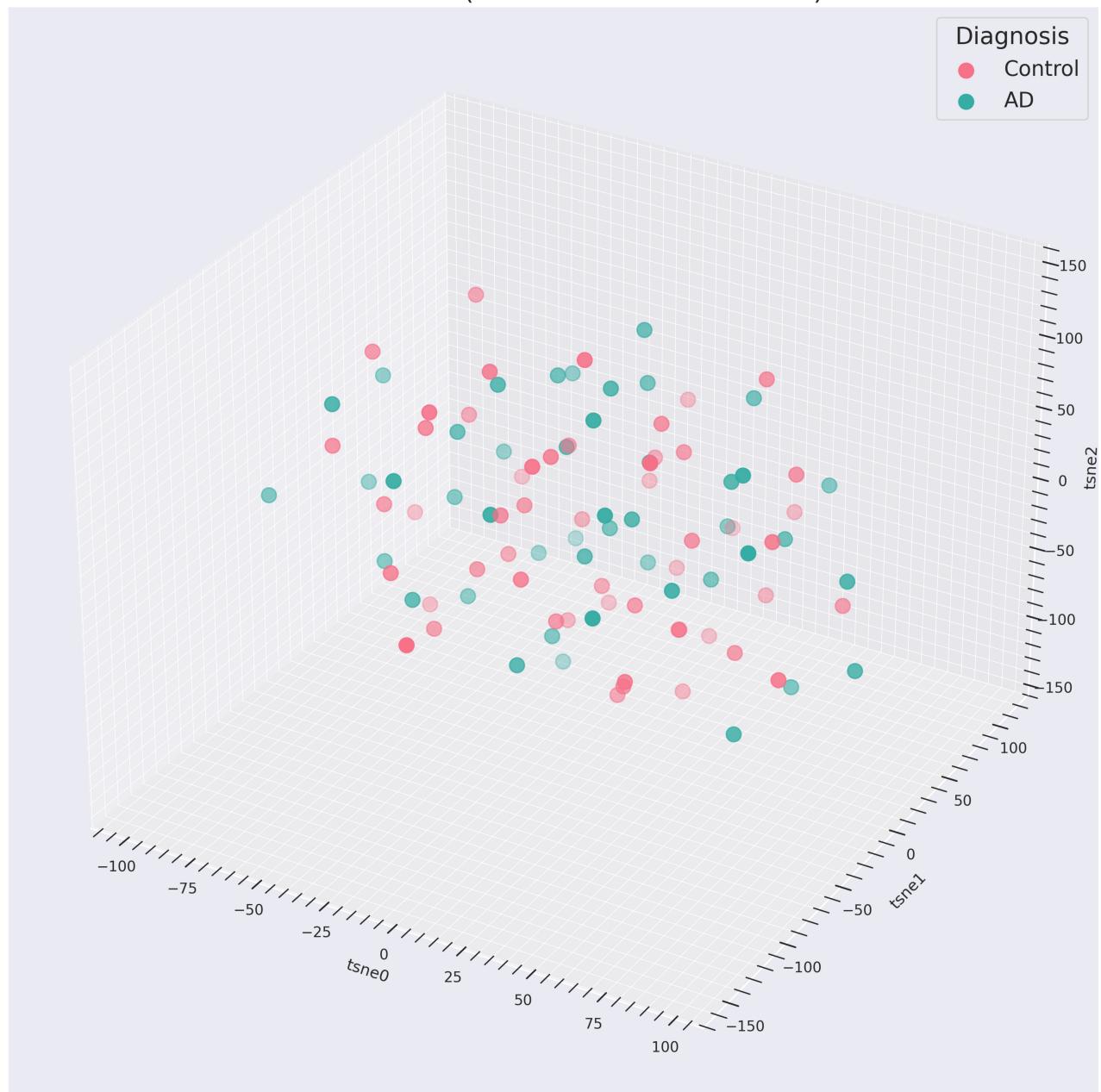
3D PCA Plot (After Feature Selection)



Analysis 6 for AD vs Control

3D tsne plot (All Features)

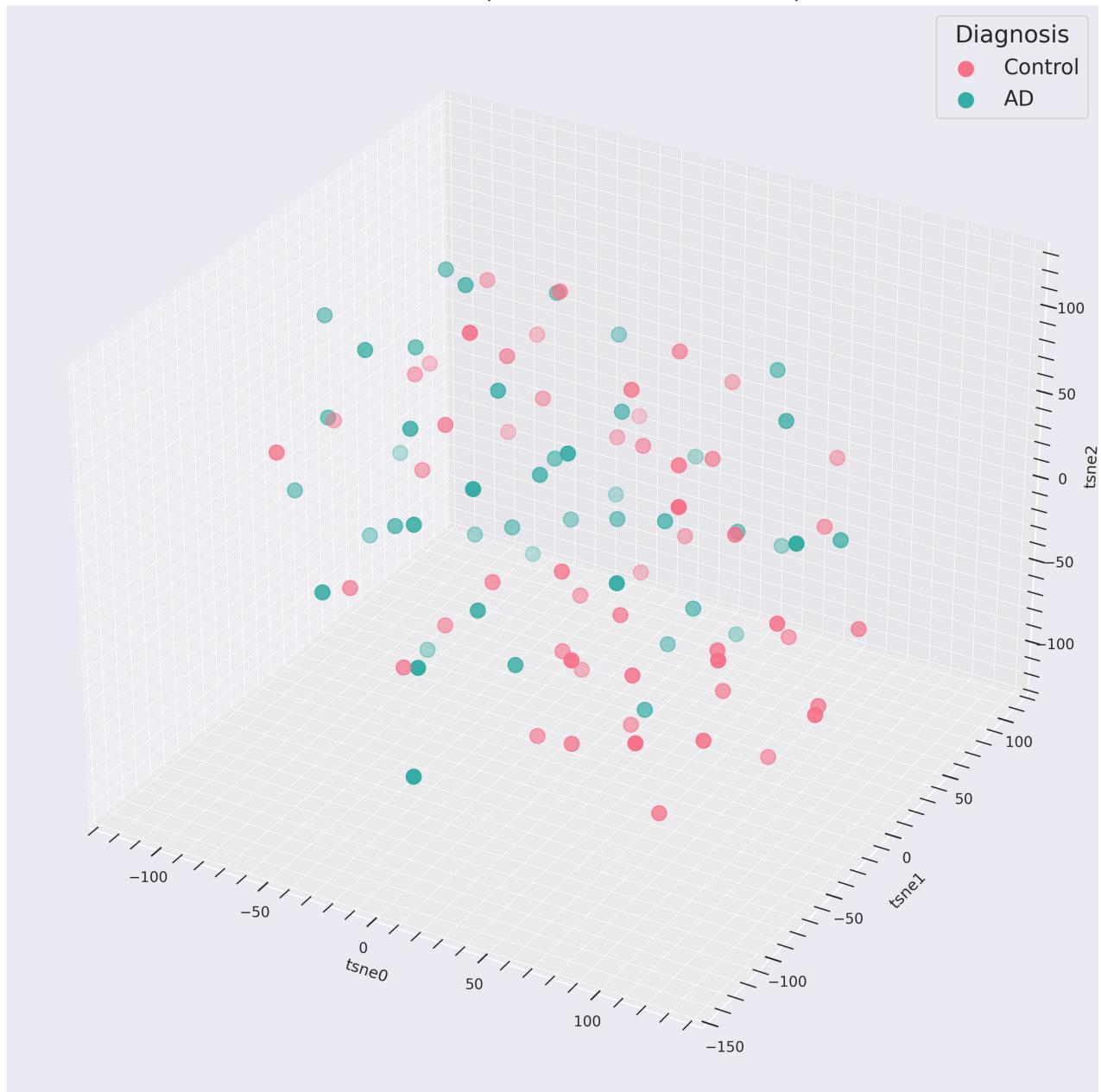
3D TSNE Plot (Without Feature Selection)



3D tsne plot (Selected Top-20 Features)

3D tsne plot (Selected Top-20 Features) (Continued)

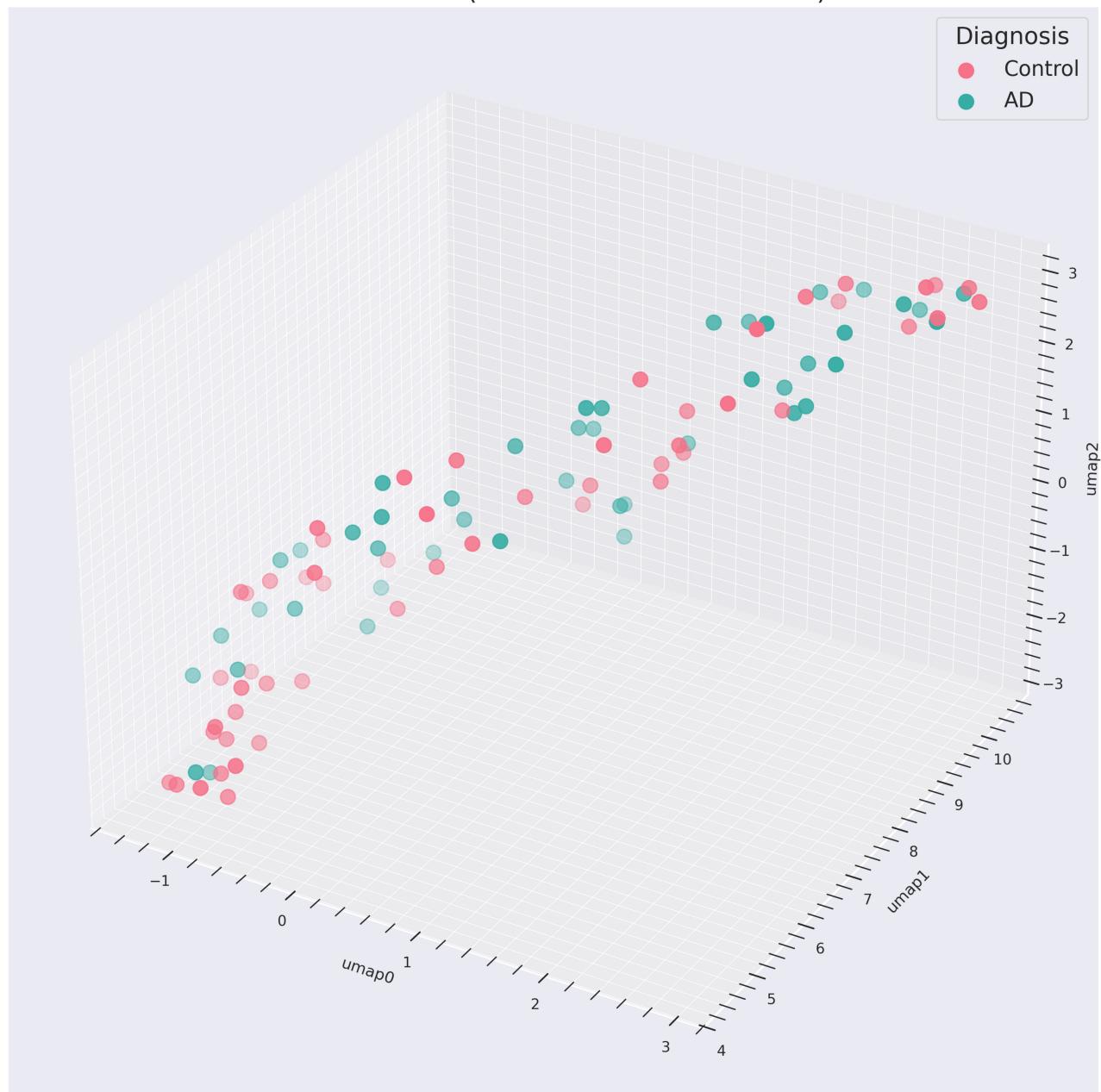
3D TSNE Plot (After Feature Selection)



Analysis 7 for AD vs Control

3D umap plot (All Features)

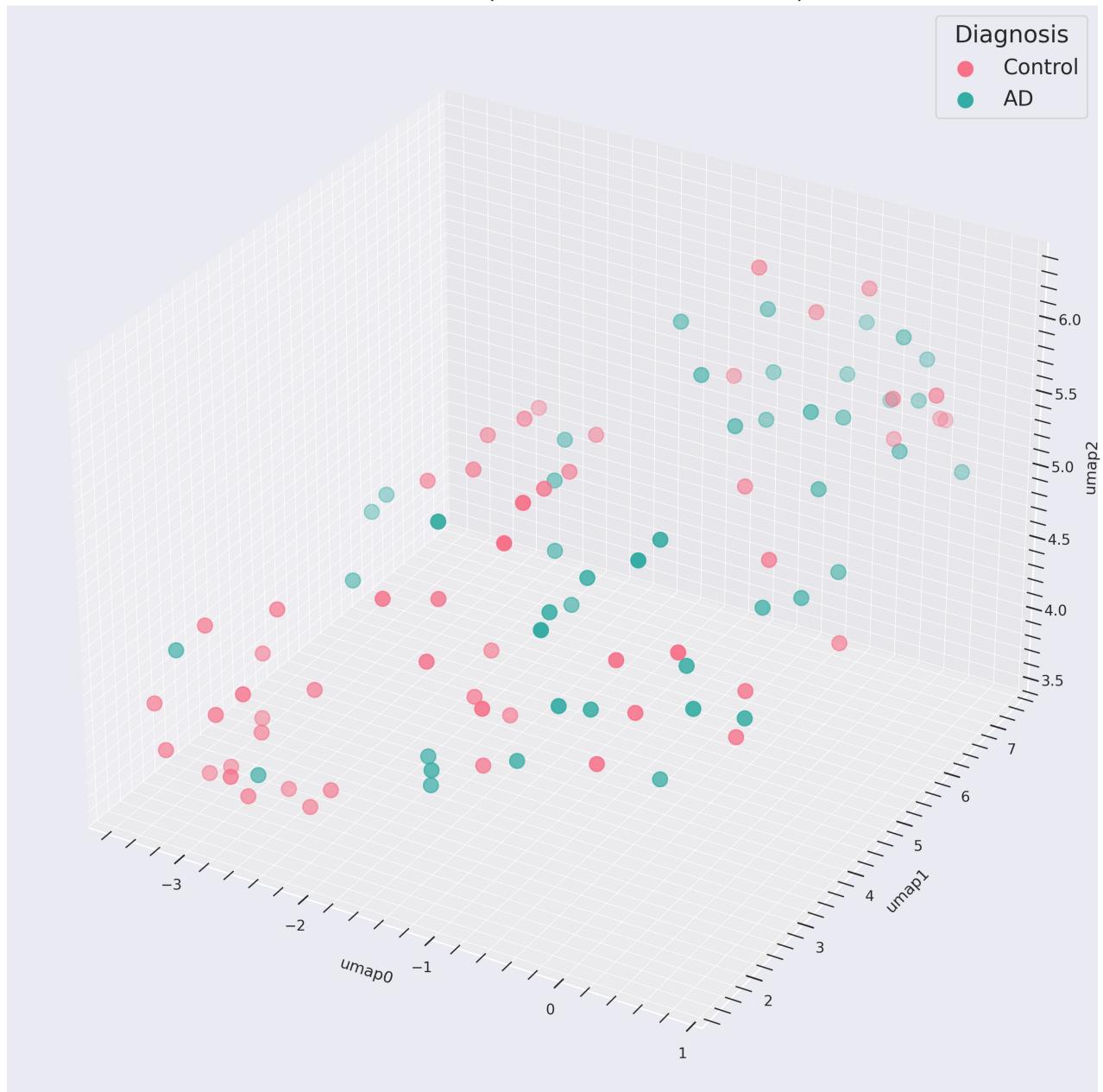
3D UMAP Plot (Without Feature Selection)



3D umap plot (Selected Top-20 Features)

3D umap plot (Selected Top-20 Features) (Continued)

3D UMAP Plot (After Feature Selection)



Analysis 8 for AD vs Control

Logistic Regression Results (All Features)

Results for Model: Logistic Regression (Without Feature Selection)

| | Accuracy | Precision | Recall | F1-Score | ROC-AUC | Support |
|-----------|----------|-----------|--------|----------|---------|---------|
| Cross Val | 0.47 | 0.52 | 0.52 | 0.52 | 0.48 | 15 |
| Train Set | 0.99 | 0.98 | 1.00 | 0.99 | 0.99 | 78 |
| Test Set | 0.65 | 0.57 | 0.89 | 0.70 | 0.67 | 20 |

Logistic Regression Results (Selected Top-20 Features)

Results for Model: Logistic Regression (After Feature Selection)

| | Accuracy | Precision | Recall | F1-Score | ROC-AUC | Support |
|-----------|----------|-----------|--------|----------|---------|---------|
| Cross Val | 0.46 | 0.52 | 0.53 | 0.51 | 0.47 | 15 |
| Train Set | 0.72 | 0.72 | 0.82 | 0.77 | 0.70 | 78 |
| Test Set | 0.65 | 0.57 | 0.89 | 0.70 | 0.67 | 20 |

Analysis 9 for AD vs Control

Random Forest Results (All Features)

Results for Model: Random Forest (Without Feature Selection)

| | Accuracy | Precision | Recall | F1-Score | ROC-AUC | Support |
|-----------|----------|-----------|--------|----------|---------|---------|
| Cross Val | 0.47 | 0.53 | 0.61 | 0.56 | 0.46 | 15 |
| Train Set | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 78 |
| Test Set | 0.65 | 0.58 | 0.78 | 0.67 | 0.66 | 20 |

Random Forest Results (Selected Top-20 Features)

Results for Model: Random Forest (After Feature Selection)

| | Accuracy | Precision | Recall | F1-Score | ROC-AUC | Support |
|-----------|----------|-----------|--------|----------|---------|---------|
| Cross Val | 0.58 | 0.64 | 0.59 | 0.61 | 0.59 | 15 |
| Train Set | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 78 |
| Test Set | 0.60 | 0.54 | 0.78 | 0.64 | 0.62 | 20 |

Analysis 10 for AD vs Control

Decision Tree Results (All Features)

Results for Model: Decision Tree (Without Feature Selection)

| | Accuracy | Precision | Recall | F1-Score | ROC-AUC | Support |
|-----------|----------|-----------|--------|----------|---------|---------|
| Cross Val | 0.46 | 0.52 | 0.57 | 0.54 | 0.45 | 15 |
| Train Set | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 78 |
| Test Set | 0.50 | 0.45 | 0.56 | 0.50 | 0.51 | 20 |

Decision Tree Results (Selected Top-20 Features)

Results for Model: Decision Tree (After Feature Selection)

| | Accuracy | Precision | Recall | F1-Score | ROC-AUC | Support |
|-----------|----------|-----------|--------|----------|---------|---------|
| Cross Val | 0.54 | 0.60 | 0.60 | 0.58 | 0.54 | 15 |
| Train Set | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 78 |
| Test Set | 0.60 | 0.55 | 0.67 | 0.60 | 0.61 | 20 |

Analysis 11 for AD vs Control

Gradient Boosting Results (All Features)

Results for Model: Gradient Boosting (Without Feature Selection)

| | Accuracy | Precision | Recall | F1-Score | ROC-AUC | Support |
|-----------|----------|-----------|--------|----------|---------|---------|
| Cross Val | 0.52 | 0.56 | 0.66 | 0.60 | 0.52 | 15 |
| Train Set | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 78 |
| Test Set | 0.40 | 0.40 | 0.67 | 0.50 | 0.42 | 20 |

Gradient Boosting Results (Selected Top-20 Features)

Results for Model: Gradient Boosting (After Feature Selection)

| | Accuracy | Precision | Recall | F1-Score | ROC-AUC | Support |
|-----------|----------|-----------|--------|----------|---------|---------|
| Cross Val | 0.57 | 0.61 | 0.71 | 0.64 | 0.59 | 15 |
| Train Set | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 78 |
| Test Set | 0.55 | 0.50 | 0.78 | 0.61 | 0.57 | 20 |

Analysis 12 for AD vs Control

AdaBoost Classifier Results (All Features)

Results for Model: AdaBoost Classifier (Without Feature Selection)

| | Accuracy | Precision | Recall | F1-Score | ROC-AUC | Support |
|-----------|----------|-----------|--------|----------|---------|---------|
| Cross Val | 0.55 | 0.61 | 0.64 | 0.61 | 0.53 | 15 |
| Train Set | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 78 |
| Test Set | 0.50 | 0.46 | 0.67 | 0.55 | 0.52 | 20 |

AdaBoost Classifier Results (Selected Top-20 Features)

Results for Model: AdaBoost Classifier (After Feature Selection)

| | Accuracy | Precision | Recall | F1-Score | ROC-AUC | Support |
|-----------|----------|-----------|--------|----------|---------|---------|
| Cross Val | 0.57 | 0.63 | 0.64 | 0.60 | 0.59 | 15 |
| Train Set | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 78 |
| Test Set | 0.45 | 0.42 | 0.56 | 0.48 | 0.46 | 20 |

Analysis 13 for AD vs Control

MLPClassifier Results (All Features)

Results for Model: MLPClassifier (Without Feature Selection)

| | Accuracy | Precision | Recall | F1-Score | ROC-AUC | Support |
|-----------|----------|-----------|--------|----------|---------|---------|
| Cross Val | 0.46 | 0.50 | 0.50 | 0.49 | 0.48 | 15 |
| Train Set | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 78 |
| Test Set | 0.50 | 0.47 | 0.78 | 0.58 | 0.53 | 20 |

MLPClassifier Results (Selected Top-20 Features)

Results for Model: MLPClassifier (After Feature Selection)

| | Accuracy | Precision | Recall | F1-Score | ROC-AUC | Support |
|-----------|----------|-----------|--------|----------|---------|---------|
| Cross Val | 0.63 | 0.69 | 0.66 | 0.66 | 0.60 | 15 |
| Train Set | 0.99 | 1.00 | 0.98 | 0.99 | 0.99 | 78 |
| Test Set | 0.65 | 0.58 | 0.78 | 0.67 | 0.66 | 20 |

Analysis 14 for AD vs Control

SVC Results (*All Features*)

Results for Model: SVC (Without Feature Selection)

| | Accuracy | Precision | Recall | F1-Score | ROC-AUC | Support |
|-----------|----------|-----------|--------|----------|---------|---------|
| Cross Val | 0.50 | 0.53 | 0.52 | 0.52 | 0.53 | 15 |
| Train Set | 0.99 | 0.98 | 1.00 | 0.99 | 0.99 | 78 |
| Test Set | 0.60 | 0.53 | 0.89 | 0.67 | 0.63 | 20 |

SVC Results (*Selected Top-20 Features*)

Results for Model: SVC (After Feature Selection)

| | Accuracy | Precision | Recall | F1-Score | ROC-AUC | Support |
|-----------|----------|-----------|--------|----------|---------|---------|
| Cross Val | 0.53 | 0.59 | 0.48 | 0.51 | 0.49 | 15 |
| Train Set | 0.73 | 0.73 | 0.82 | 0.77 | 0.72 | 78 |
| Test Set | 0.65 | 0.57 | 0.89 | 0.70 | 0.67 | 20 |