

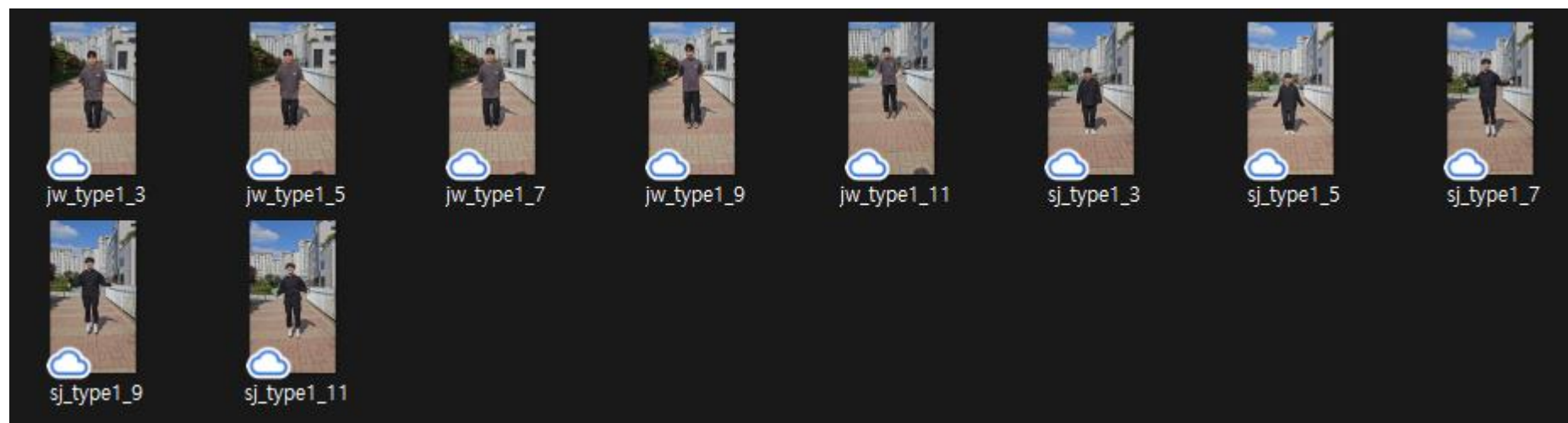
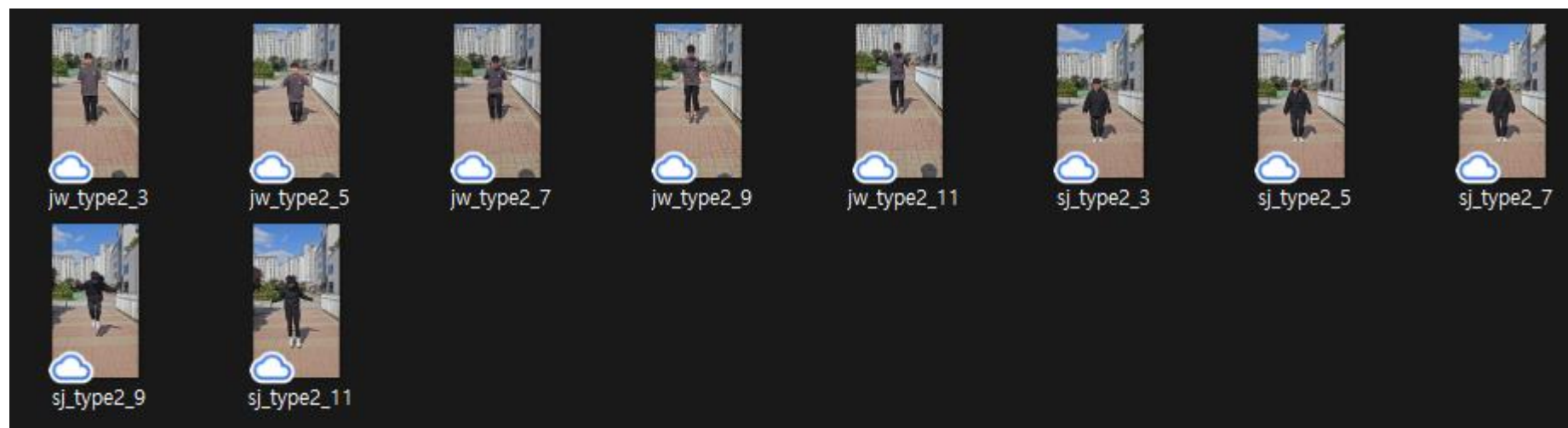
줄넘기 개수 예측 모델

Dataset

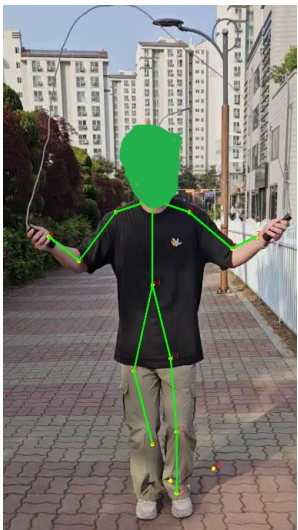
type	Single	Double
count	3	3
	5	5
	7	7
	9	9
	11	11

2명의 동작 수행자가 각각 수행하여 총 20개의 줄넘기 영상을 데이터셋으로 구축

Dataset



Preprocessing



Frame	Head	Neck	RShoulder	RShoulder	LShoulder	LShoulder	RElbow_X	RElbow_Y	LElbow_X	LElbow_Y	RWrist_X	RWrist_Y	LWrist_X	LWrist_Y	RHip_X	RHip_Y	LLHip_X	LLHip_Y	RKnee_X	RKnee_Y	LKnee_X	LKnee_Y	RAnkle_X	RAnkle_Y	LAnkle_X	LAnkle_Y
0	335	548	411	609	651	609	394	761	702	761	342	792	720	792	462	944	582	914	462	1005	582	1036	497	1280	514	
1	365	548	411	609	651	609	377	792	702	792	325	822	720	822	462	944	600	883	462	1005	600	1158	497	1280	56	
2	365	548	411	640	634	609	377	792	685	792	325	853	720	822	480	944	600	944	462	1036	582	1127	514	1280	56	
3	365	548	411	640	634	609	377	792	668	761	308	853	737	822	480	975	600	944	480	1280	514	1249	514	1280	56	
4	335	548	411	609	651	609	360	792	685	761	291	853	754	792	480	944	582	914	462	1005	617	1097	514	1280	56	
5	335	518	411	609	634	579	360	761	685	731	274	792	771	761	462	944	600	914	462	975	600	1158	514	1280	56	
6	304	487	411	579	634	548	360	740	702	700	274	761	788	731	480	883	582	883	462	1036	600	1097	497	1280	56	
7	274	457	411	518	634	518	360	670	702	640	240	700	805	670	480	883	582	853	462	1036	582	1066	480	1249	58	
8	243	426	411	487	634	487	342	640	720	609	240	640	822	609	480	853	582	582	462	1036	582	1066	462	1249	58	
9	213	396	411	457	634	457	360	609	720	579	222	579	805	548	480	853	582	822	462	1097	600	1097	462	1280	61	
10	182	365	411	457	634	426	342	579	720	579	240	548	805	518	480	792	582	792	462	1036	600	1066	462	1219	60	
11	182	365	411	426	634	426	342	579	720	548	240	518	788	518	462	792	582	792	462	1066	600	1097	462	1219	58	
12	182	365	411	426	634	426	360	579	702	548	257	518	788	518	480	822	582	792	462	1127	600	1066	480	1219	58	
13	182	365	411	426	634	426	360	579	702	548	274	518	771	518	462	792	582	792	462	1097	600	1036	480	1219	60	
14	182	365	411	426	634	426	360	579	685	579	291	518	754	548	480	792	582	792	480	1036	600	1036	462	1219	60	
15	182	396	411	457	634	457	377	609	668	579	308	548	737	548	480	853	582	822	480	1066	600	1127	480	1249	60	
16	213	426	411	487	634	457	394	640	668	609	342	579	737	609	480	853	582	853	462	1188	600	1158	462	1280	60	
17	243	457	411	518	634	518	394	670	651	640	360	640	720	640	480	853	600	853	480	1188	600	1188	497	1249	60	
18	274	487	411	548	634	518	411	700	685	670	360	700	702	670	480	883	582	883	462	1127	582	914	480	1249	61	
19	304	518	411	579	651	579	377	731	702	731	377	761	737	731	480	914	600	914	480	1249	600	944	480	1249	60	
20	335	548	411	609	651	609	394	761	702	761	377	792	720	792	480	1005	582	975	480	1249	600	1036	497	1249	58	
21	365	548	411	640	651	609	394	792	702	792	360	853	702	822	480	975	582	975	497	1249	600	1097	497	1249	58	

별도의 csv 파일로 저장

줄넘기 수행 영상으로부터
각 관절의 좌표 데이터 추출

사용 모델

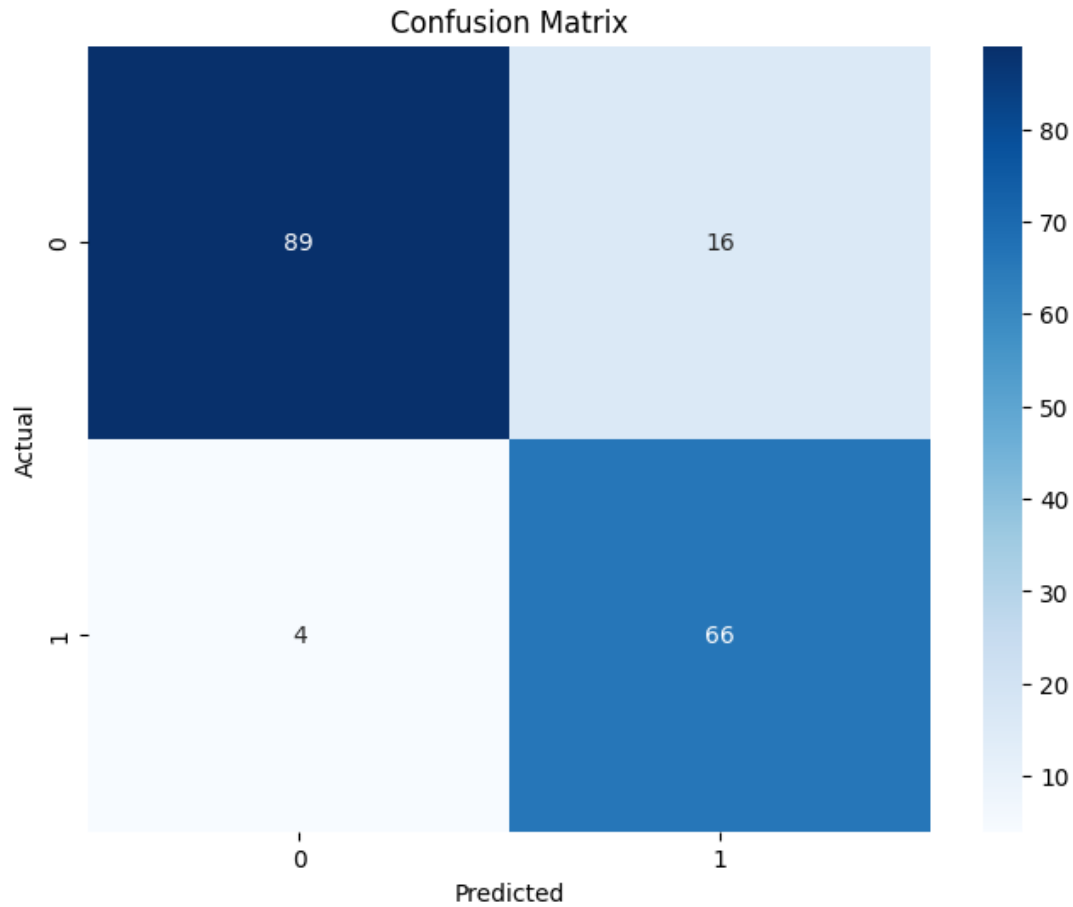
- Gradient Boosting Classifier
- KNeighbors Classifier
- Logistic Regression
- Random Forest Classifier
- Support Vector Classifier
- DNN
- LSTM

Gradient Boosting Classifier

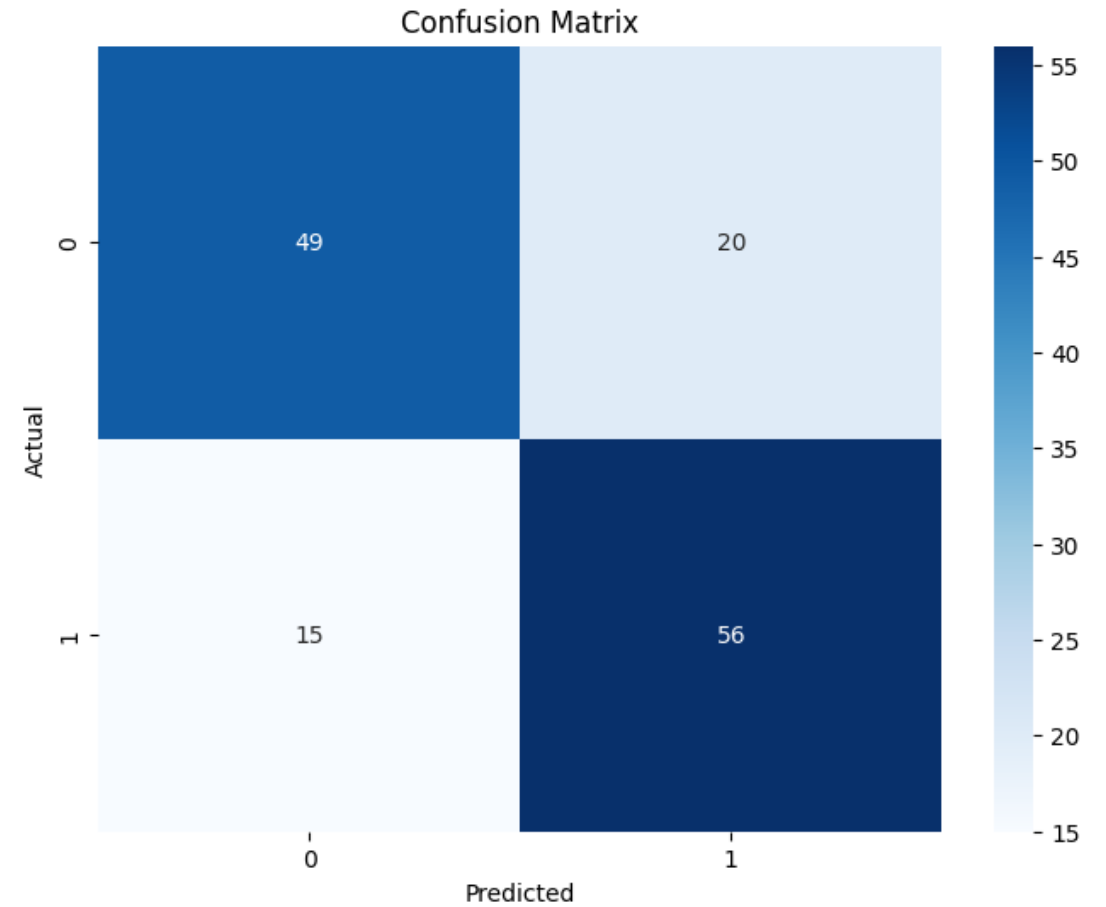
줄넘기 성능 평가

	Precision	Recall	Accuracy	AUC Score	F1 Score
Single	0.8049	0.9429	0.8857	0.9753	0.8684
Double	0.7368	0.7887	0.8660	0.7619	0.7500

Confusion Matrix

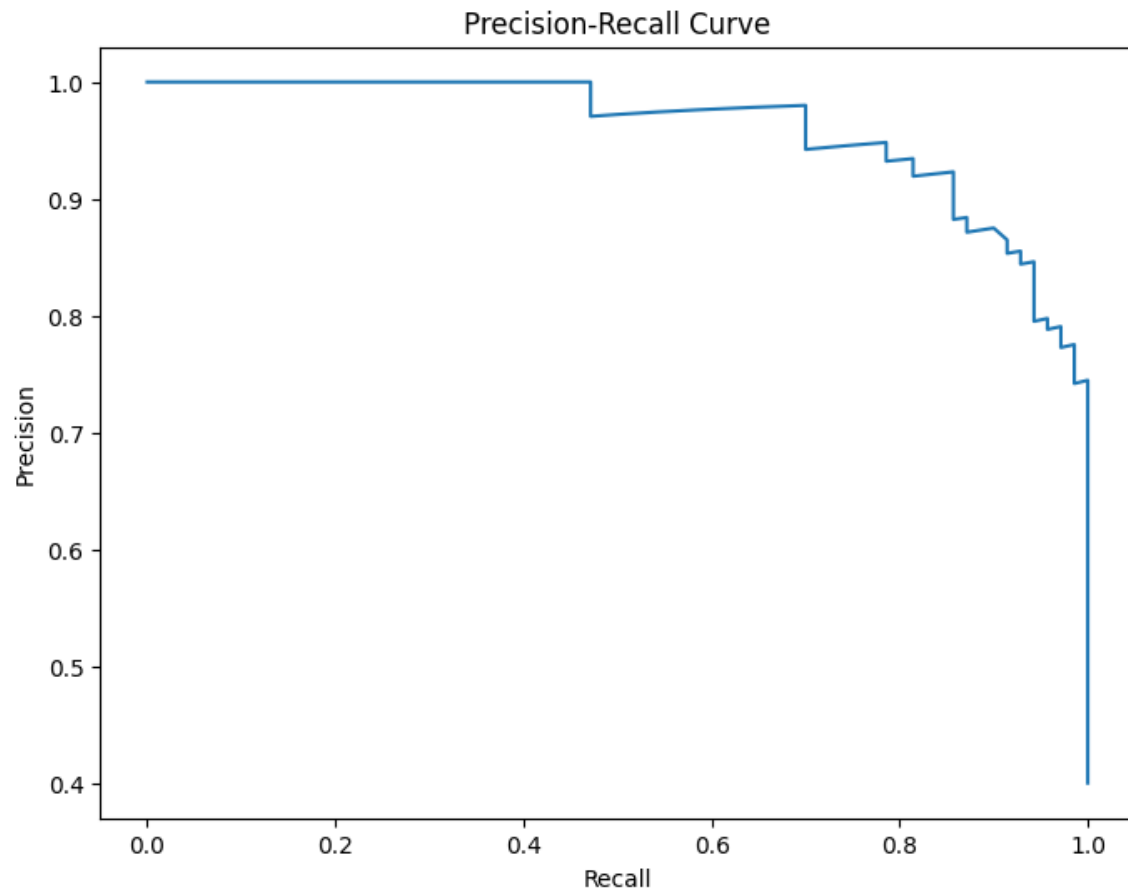


Single Jumprope

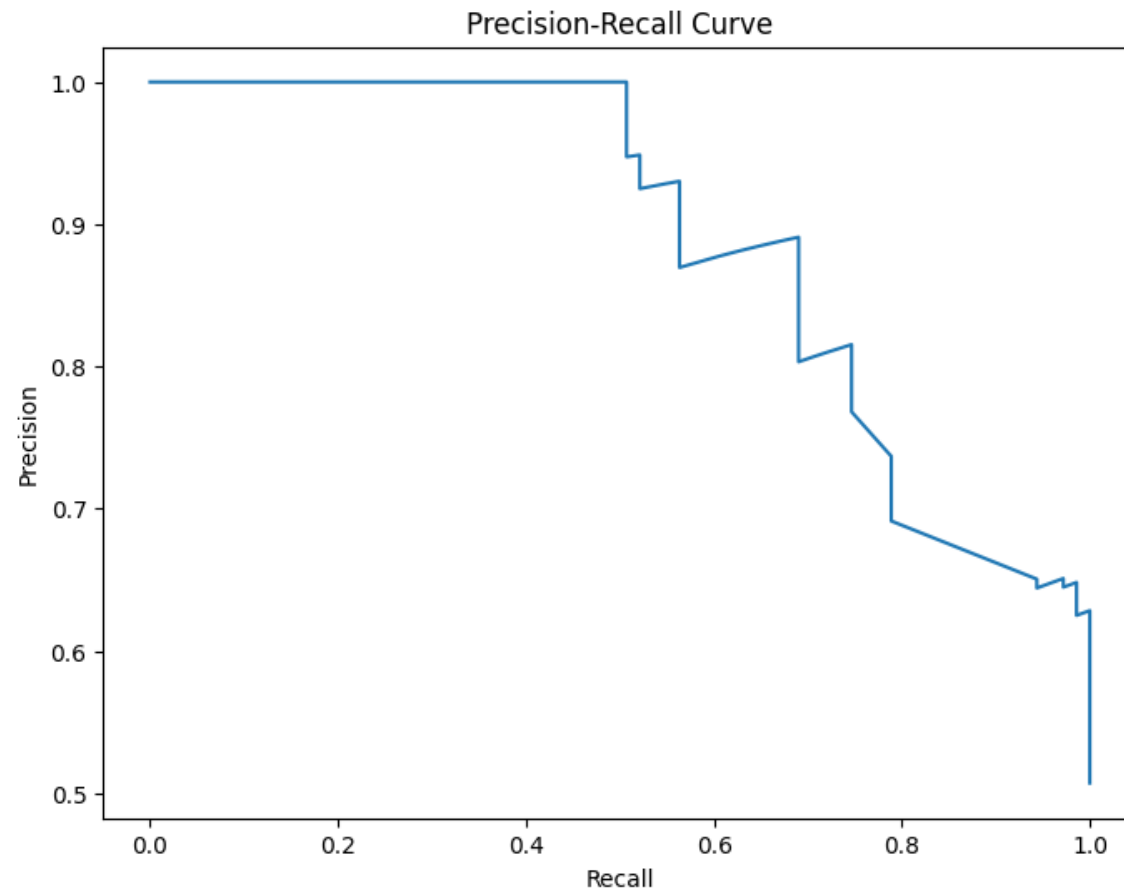


Double Jumprope

PR Curve

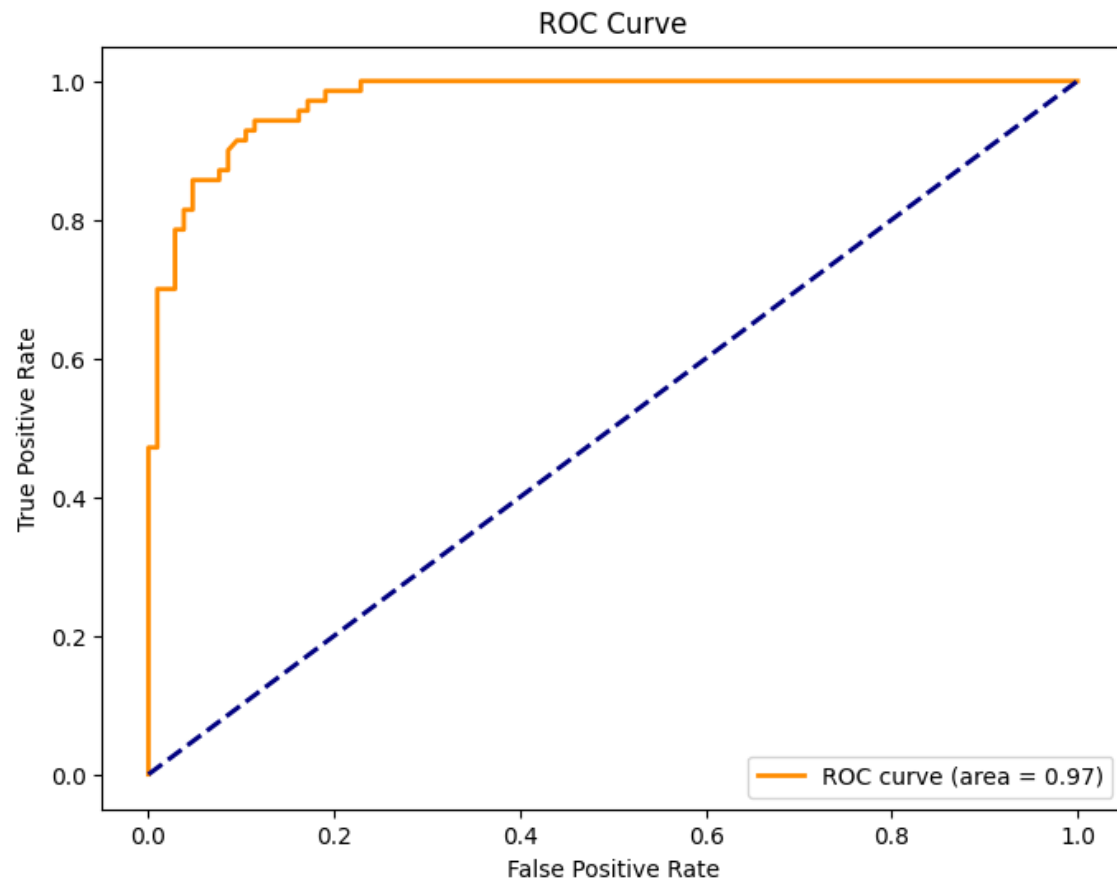


Single Jumprope

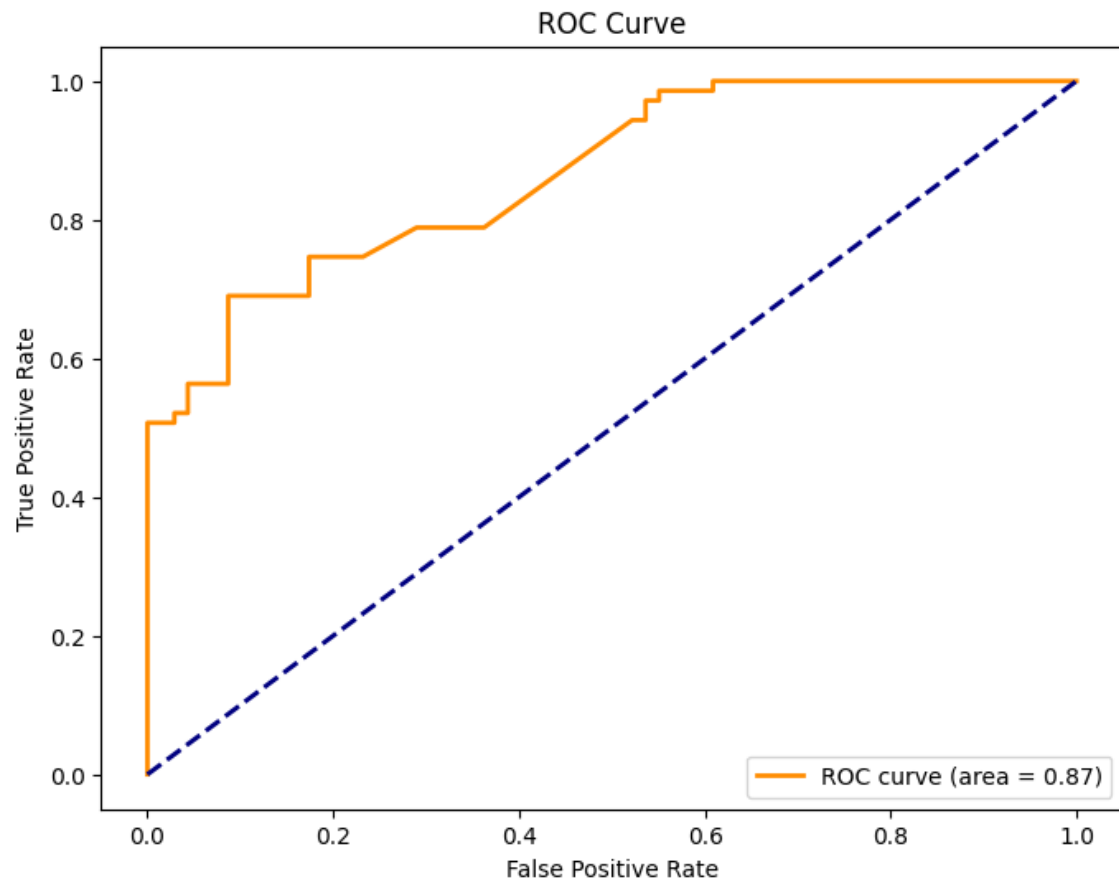


Double Jumprope

ROC Curve

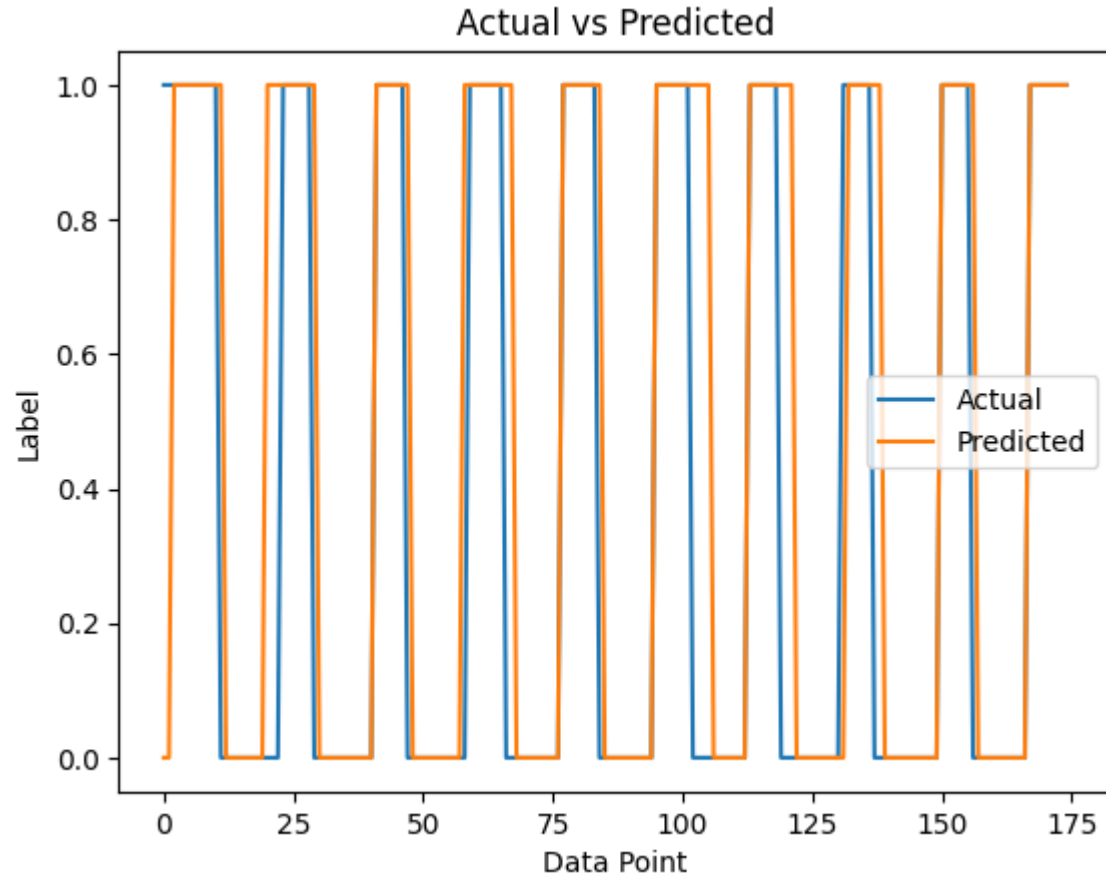


Single Jumprope



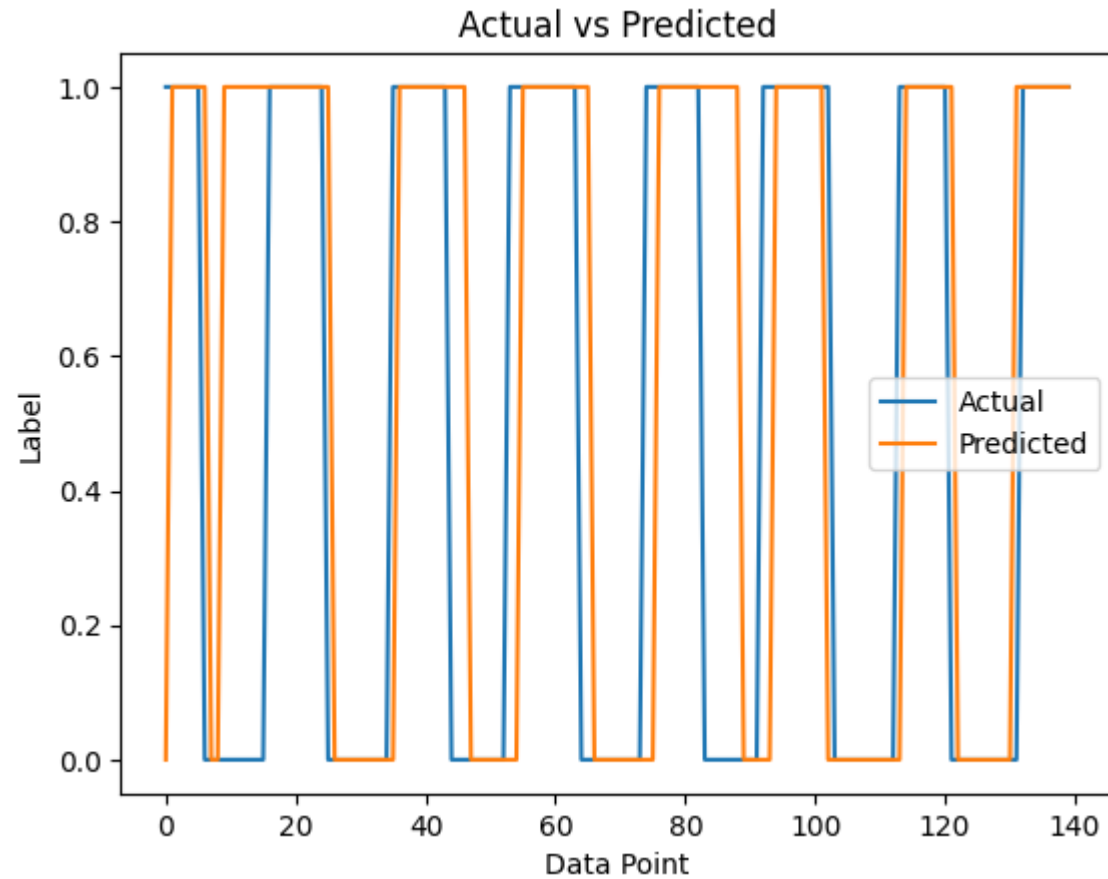
Double Jumprope

일반 줄넘기(single) 예측 결과



Label : 9
Pred : 10

쌍쌍이(double) 예측 결과



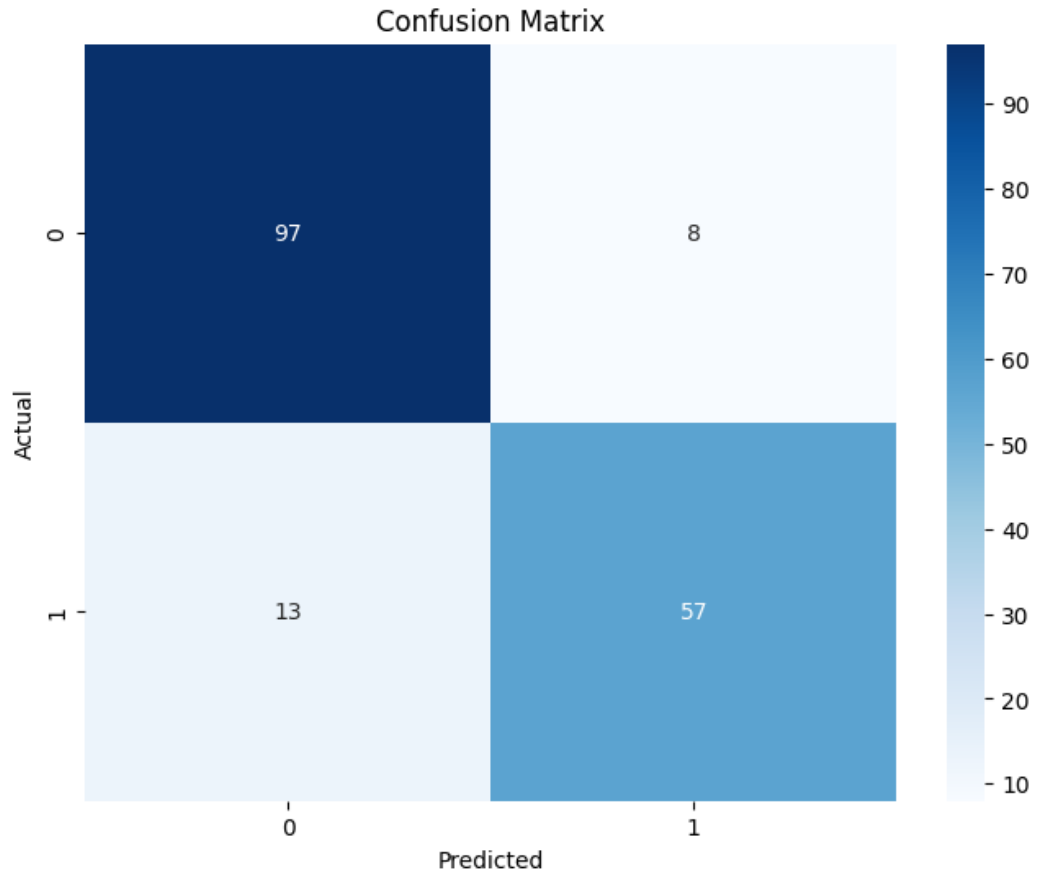
Label : 7
Pred : 8

KNeighbors Classifier

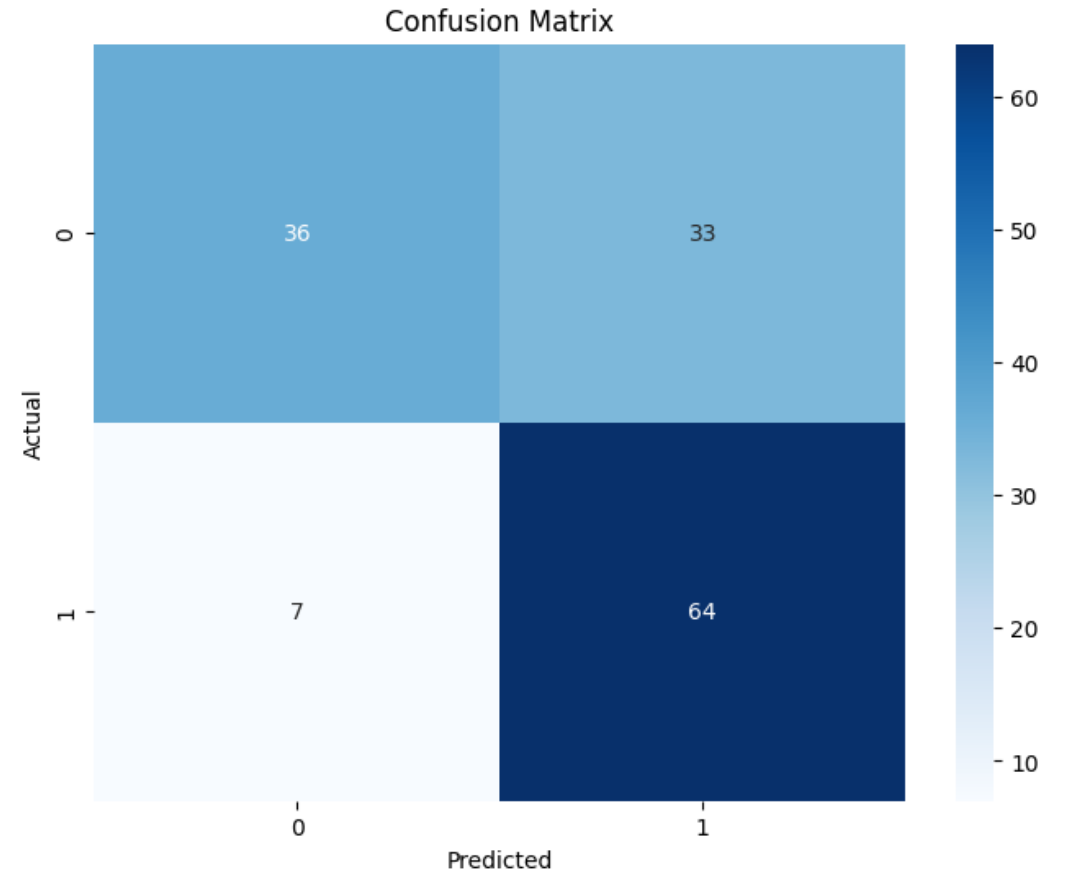
줄넘기 성능 평가

	Precision	Recall	Accuracy	AUC Score	F1 Score
Single	0.8769	0.8143	0.8800	0.9373	0.8444
Double	0.6598	0.9014	0.7944	0.7619	0.7143

Confusion Matrix

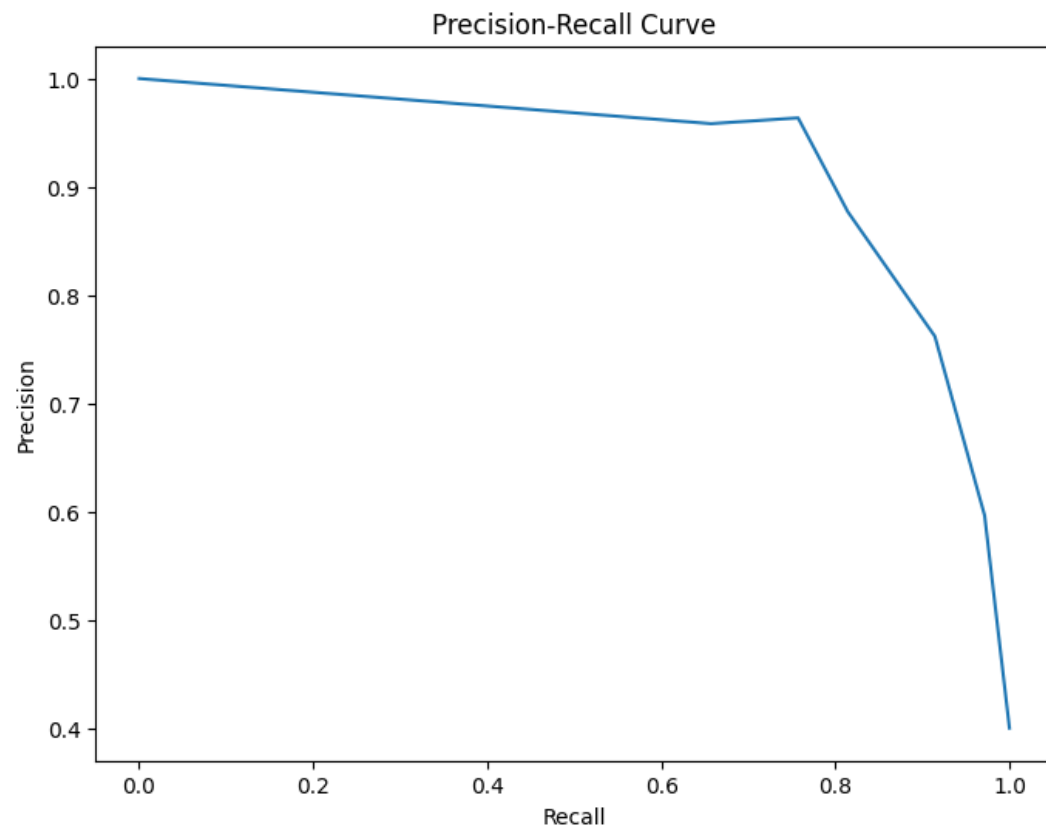


Single Jumprope

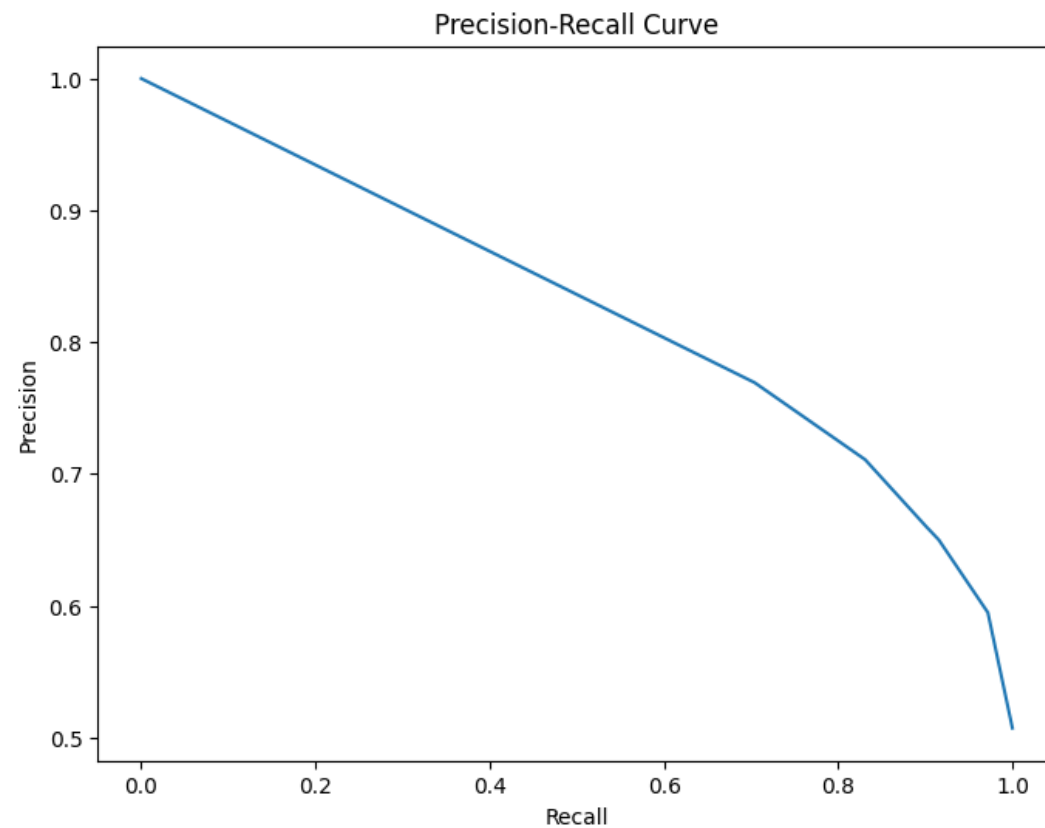


Double Jumprope

PR Curve

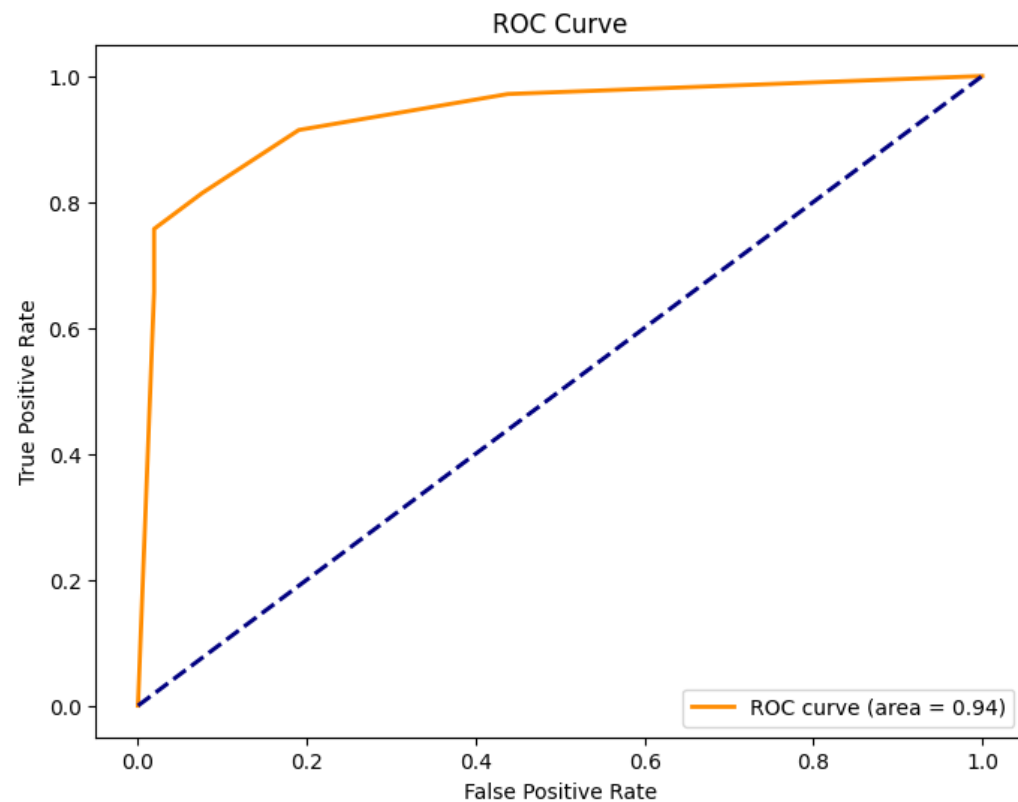


Single Jump rope

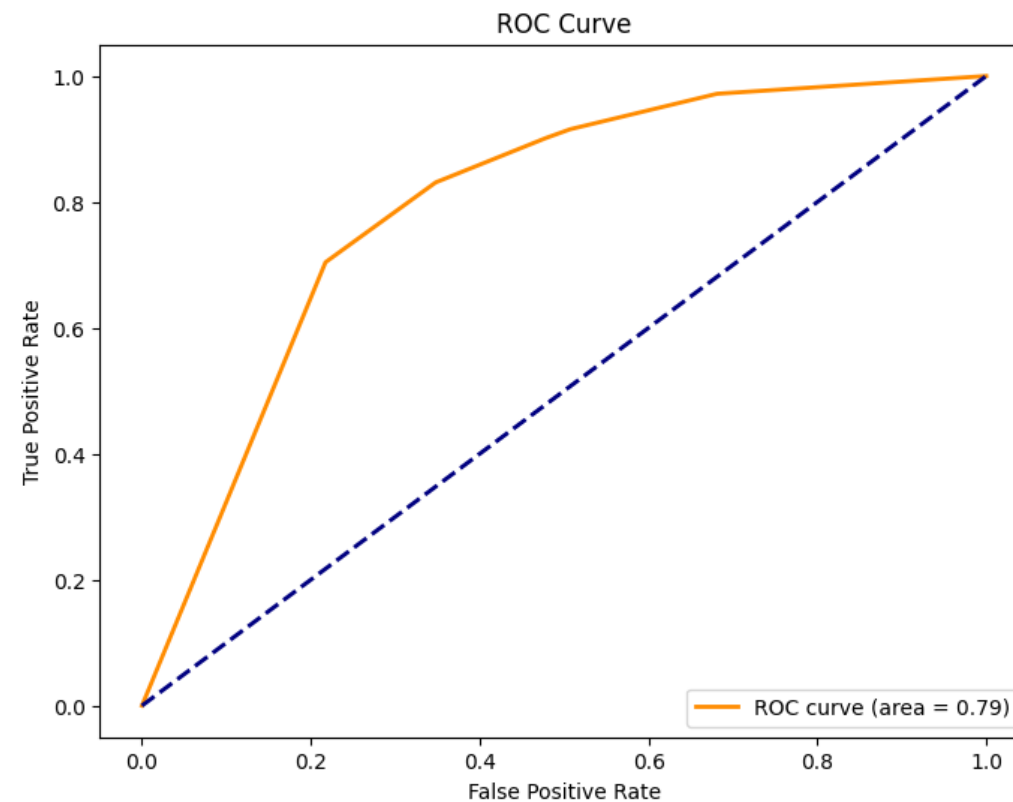


Double Jump rope

ROC Curve

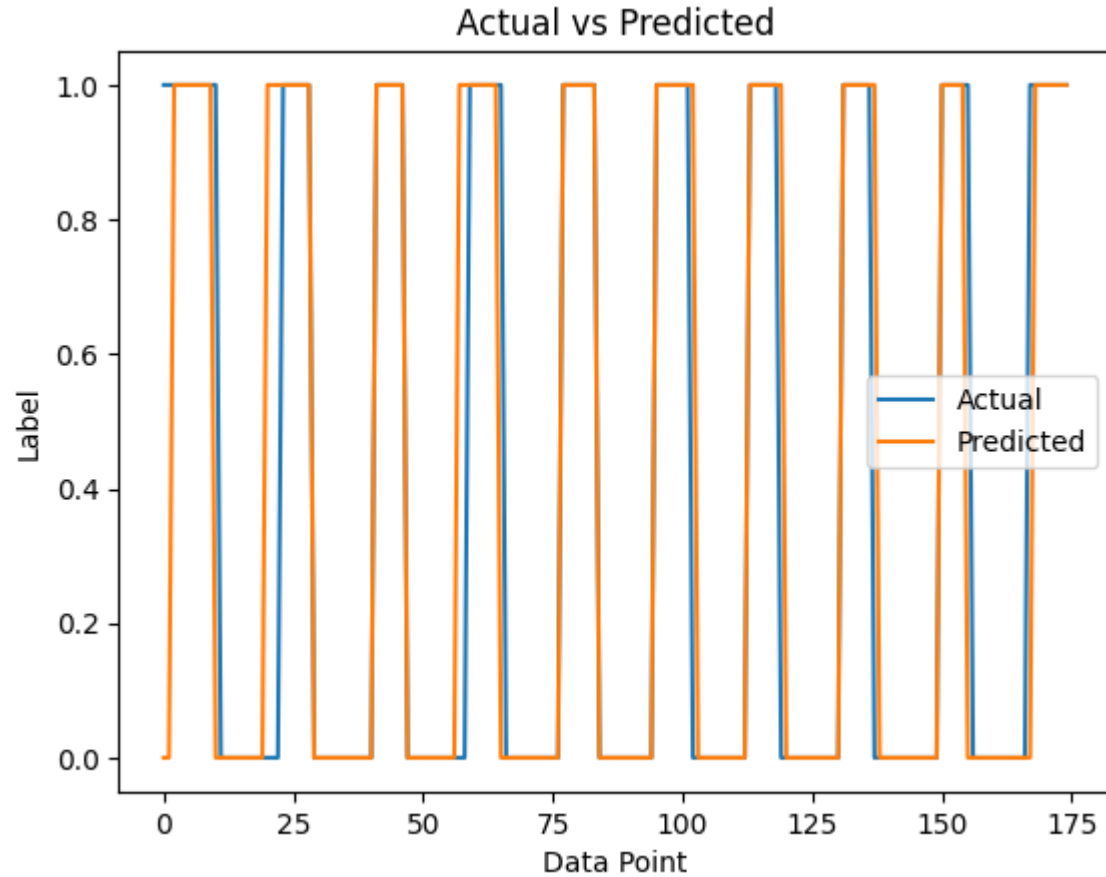


Single Jumprope



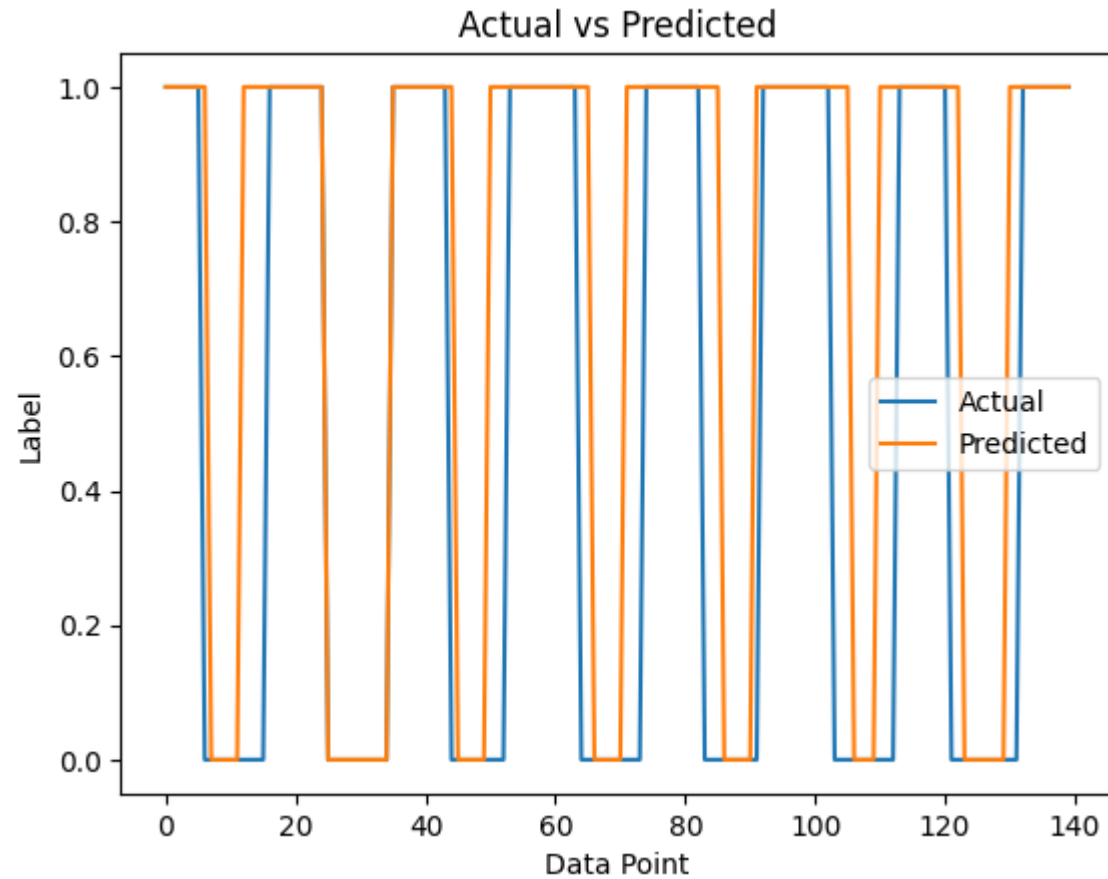
Double Jumprope

일반 줄넘기(single) 예측 결과



Label : 9
Pred : 10

쌍쌍이(double) 예측 결과



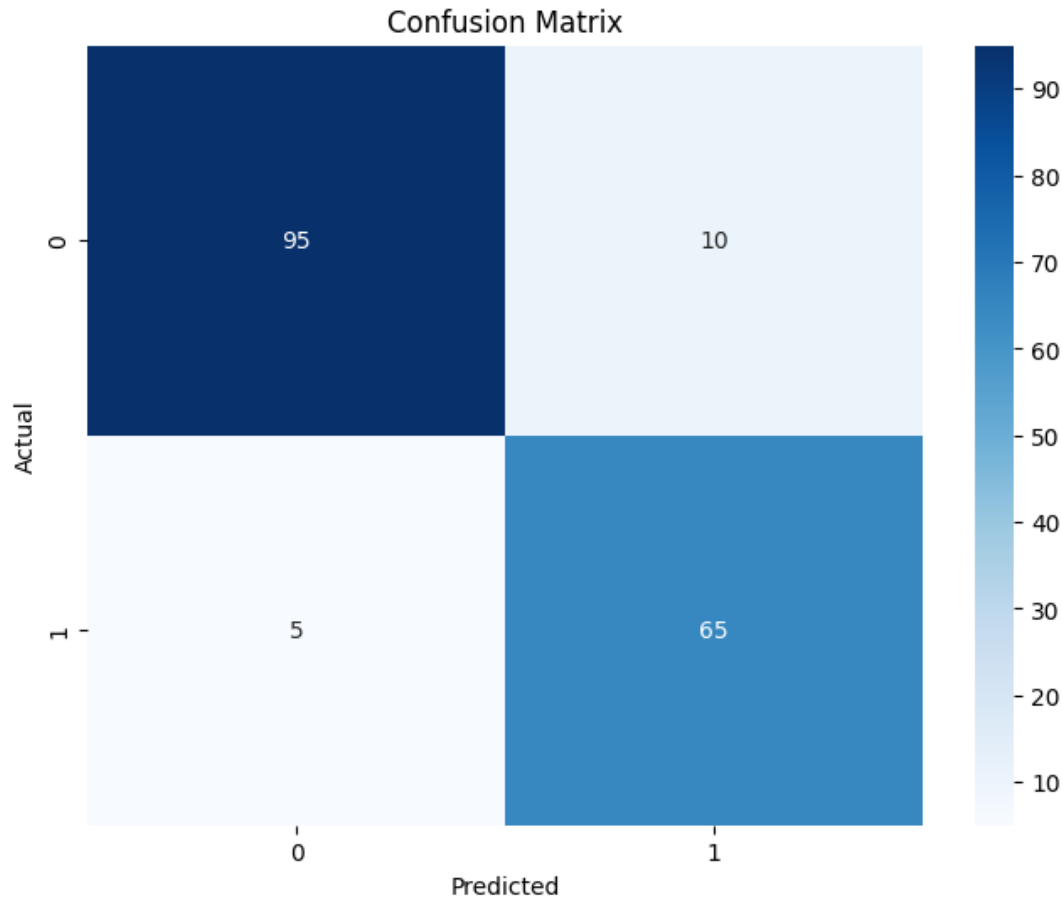
Label : 7
Pred : 7

Logistic Regression

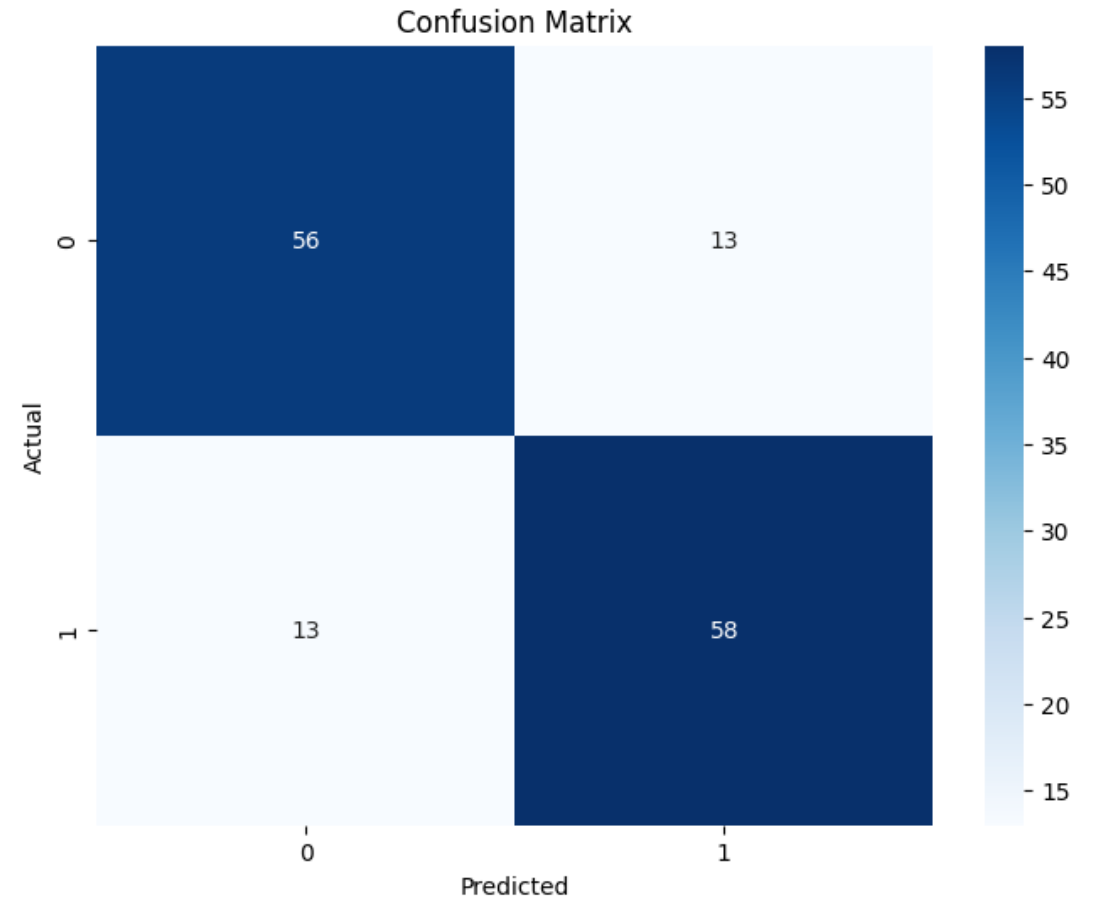
줄넘기 성능 평가

	Precision	Recall	Accuracy	AUC Score	F1 Score
Single	0.8667	0.9286	0.9143	0.9750	0.8966
Double	0.8169	0.8169	0.8143	0.9174	0.8169

Confusion Matrix

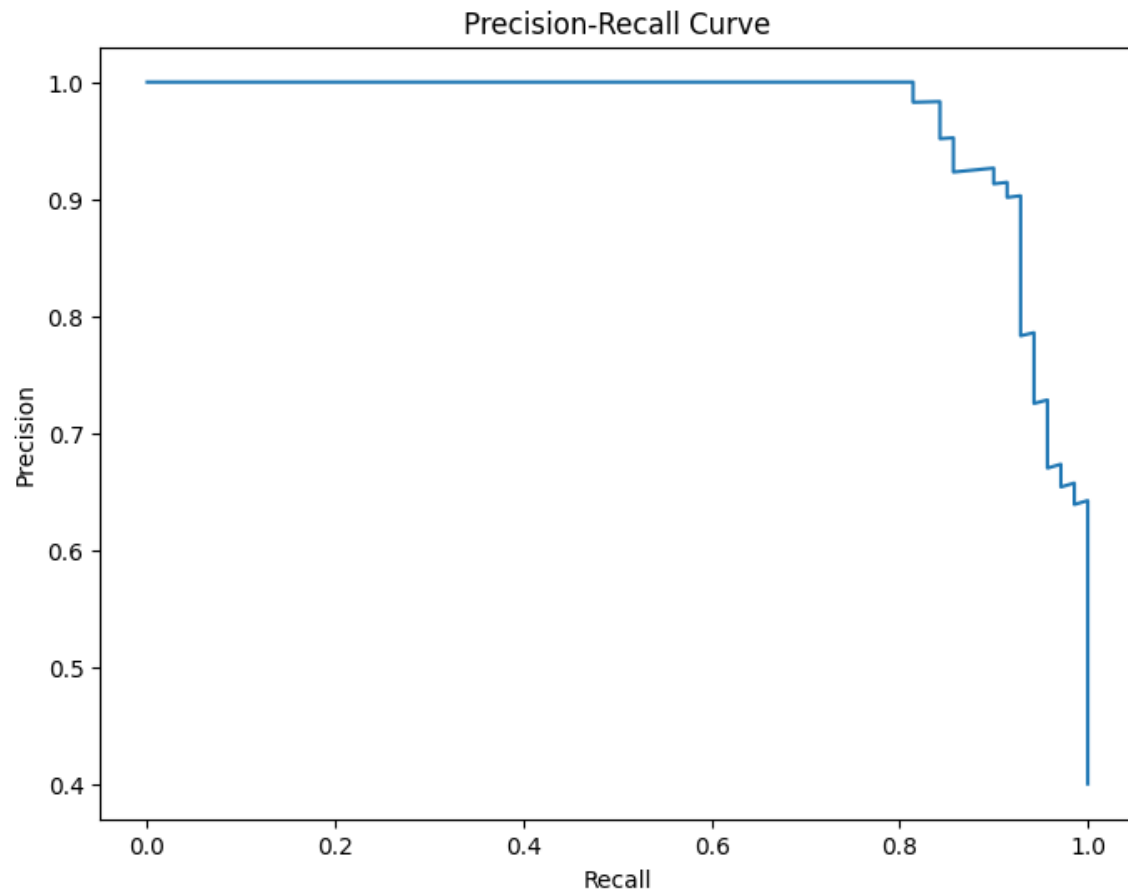


Single Jumprope

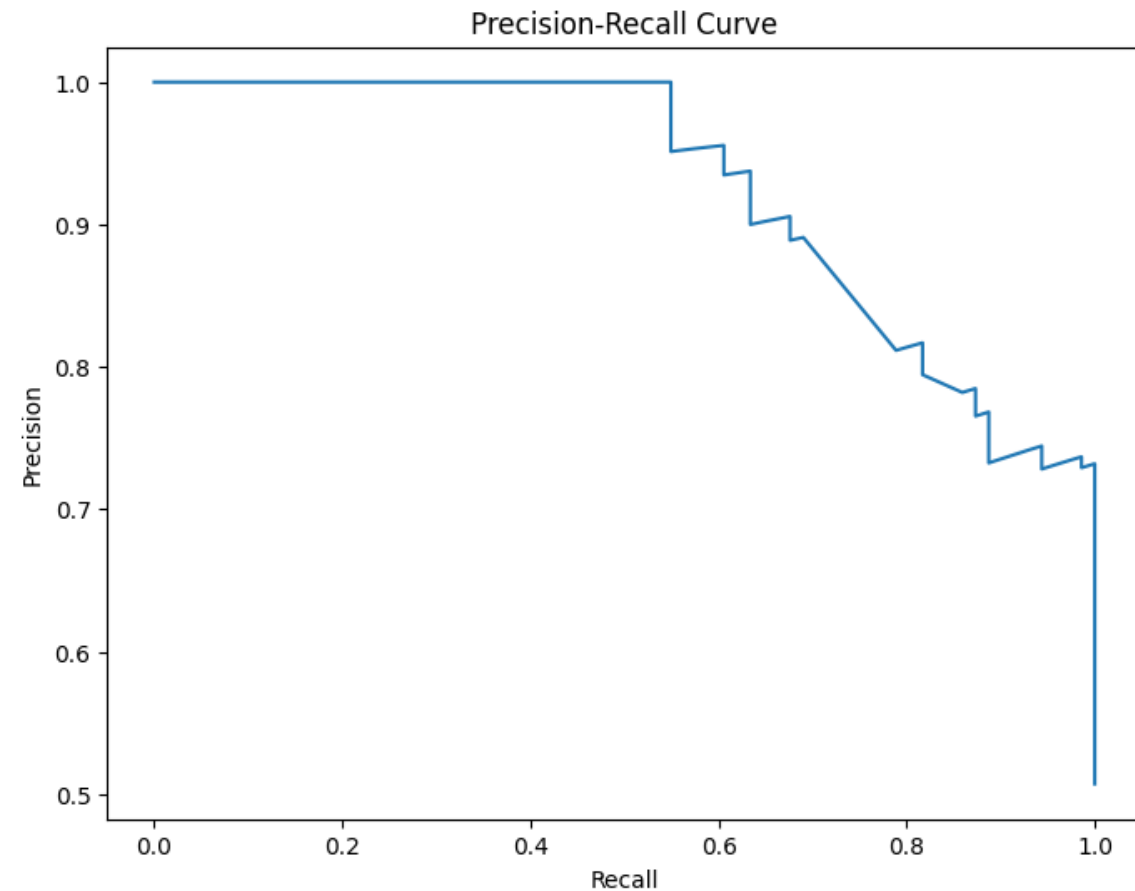


Double Jumprope

PR Curve

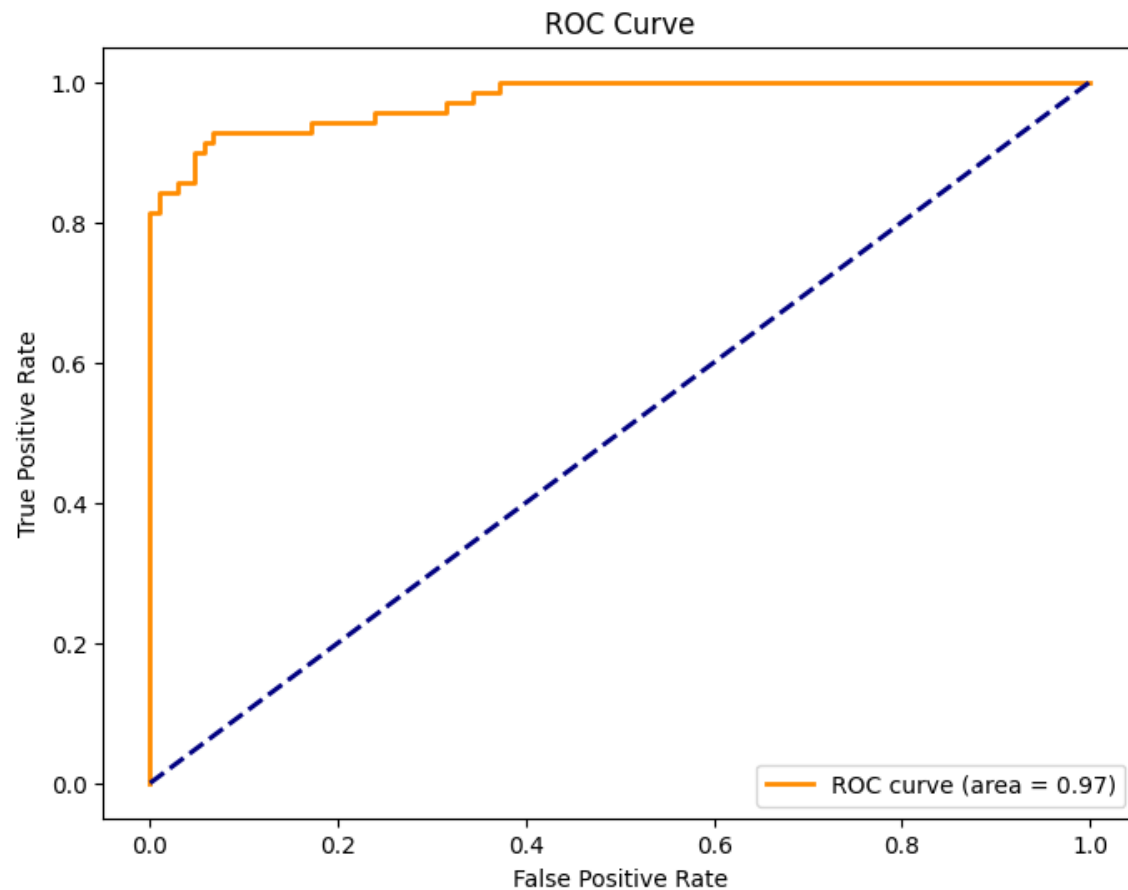


Single Jumprope

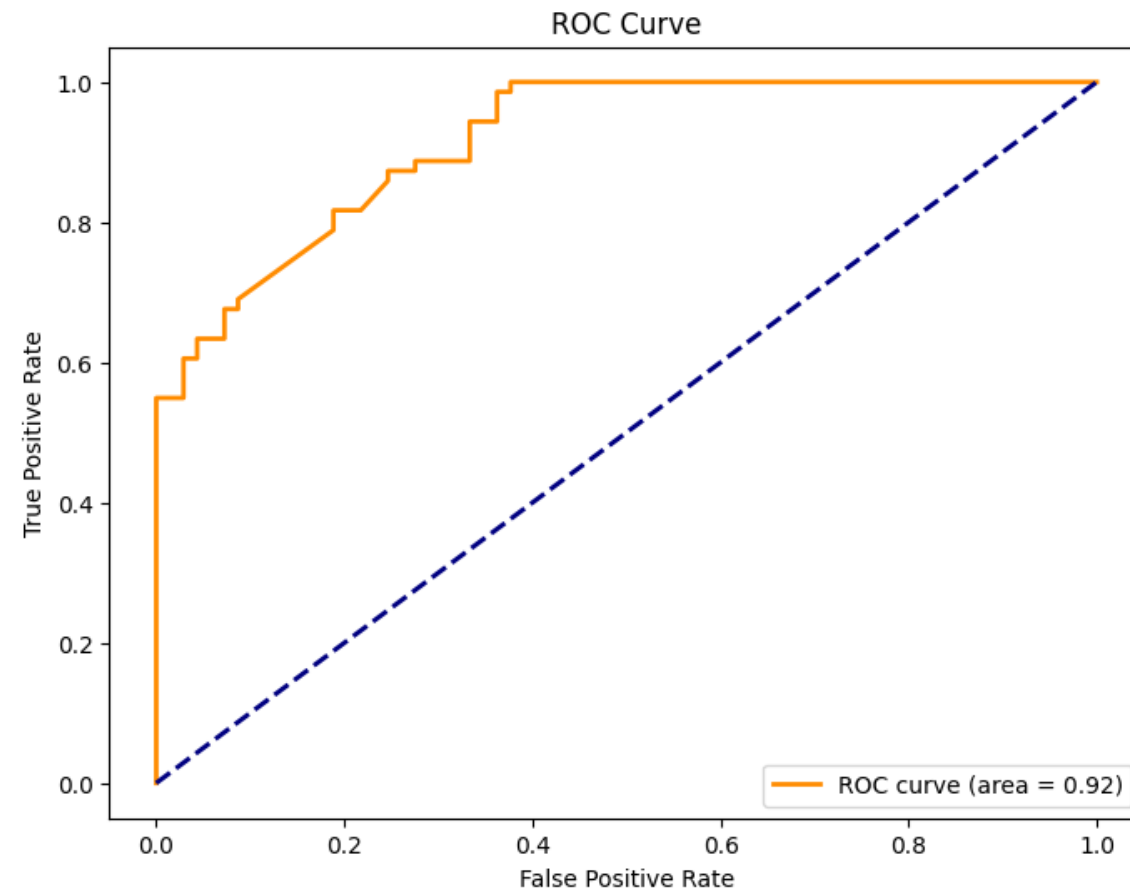


Double Jumprope

ROC Curve

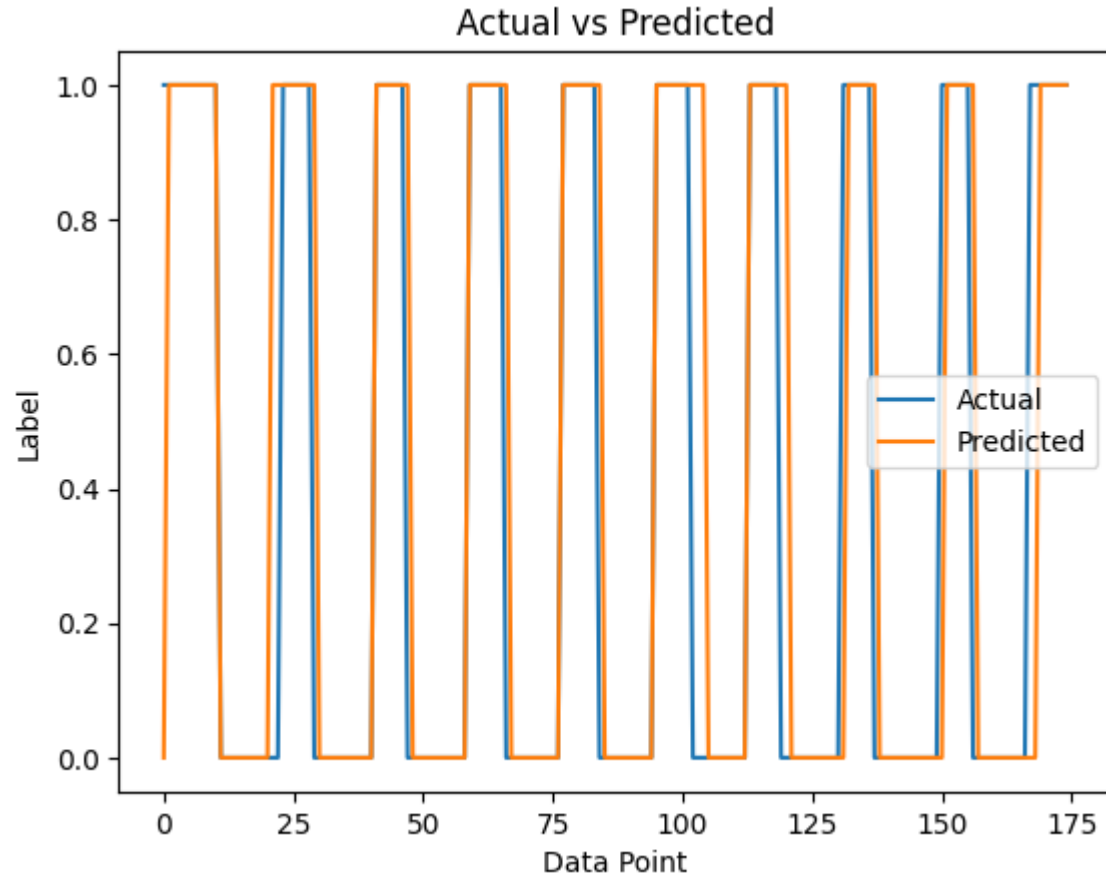


Single Jumprope



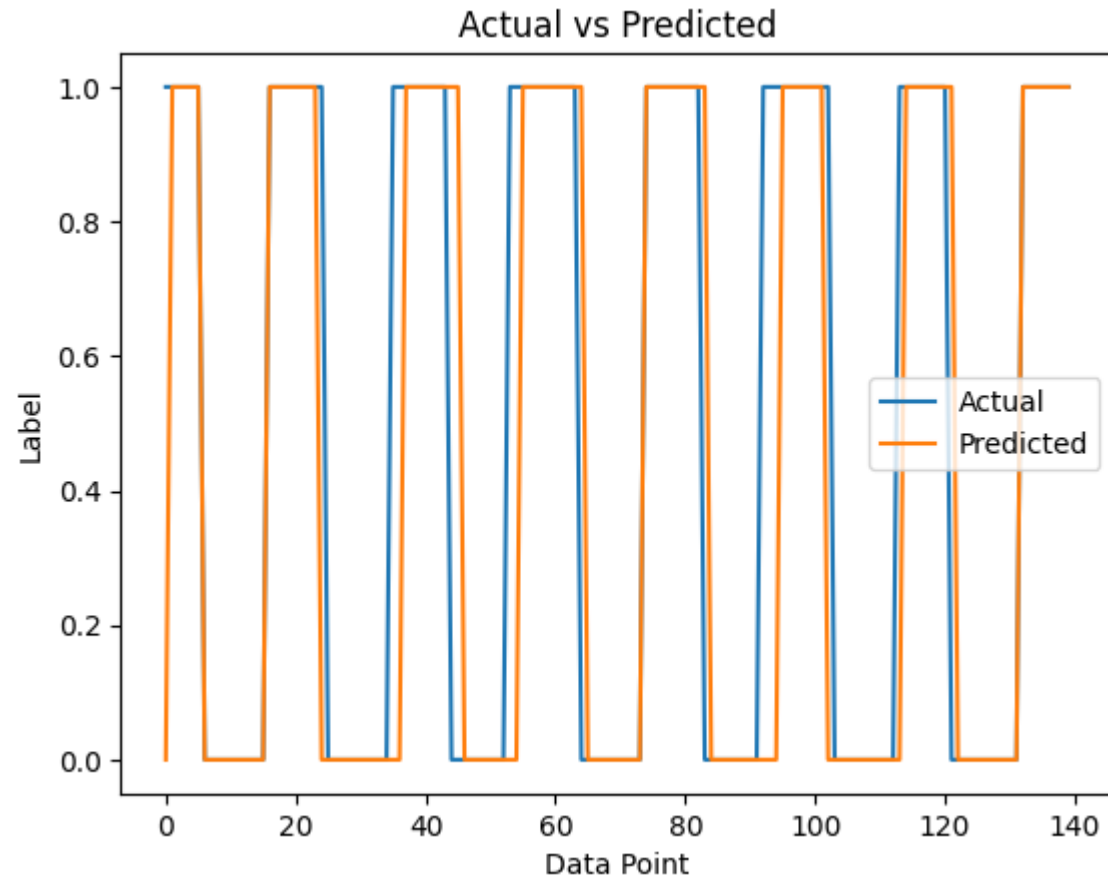
Double Jumprope

일반 줄넘기(single) 예측 결과



Label : 9
Pred : 10

쌍쌍이(double) 예측 결과



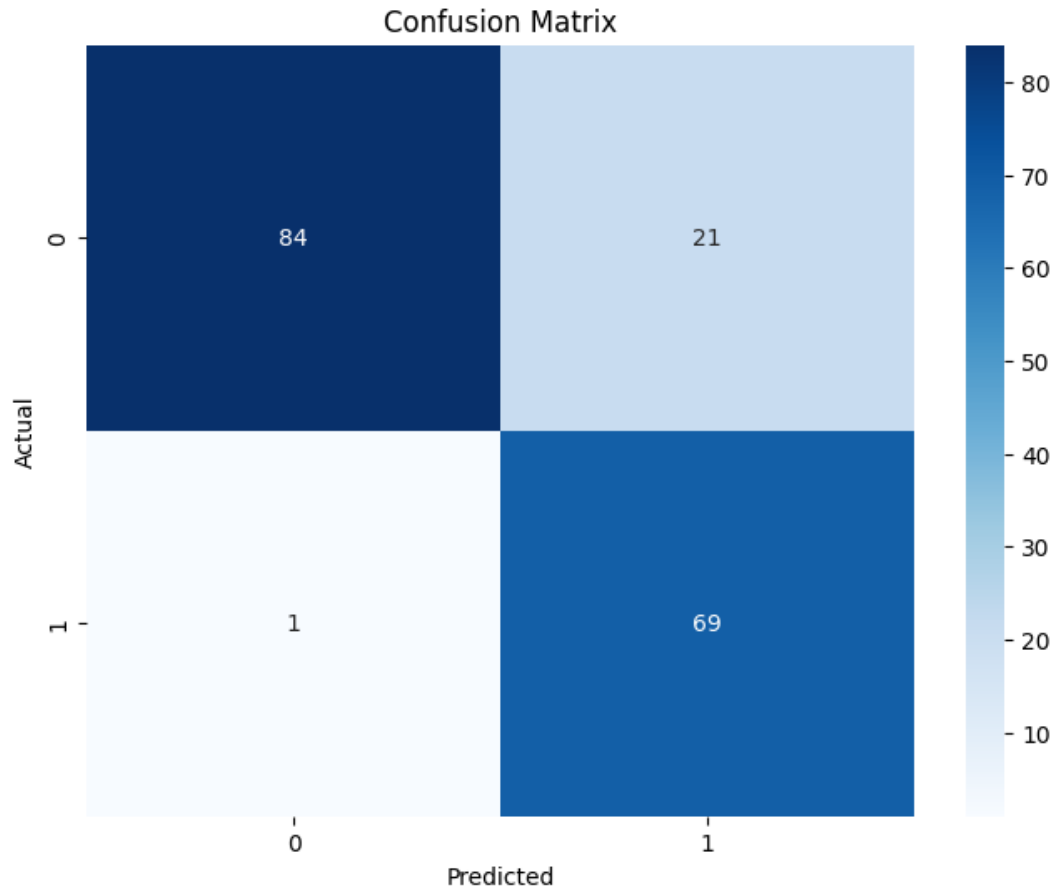
Label : 7
Pred : 8

Random Forest Classifier

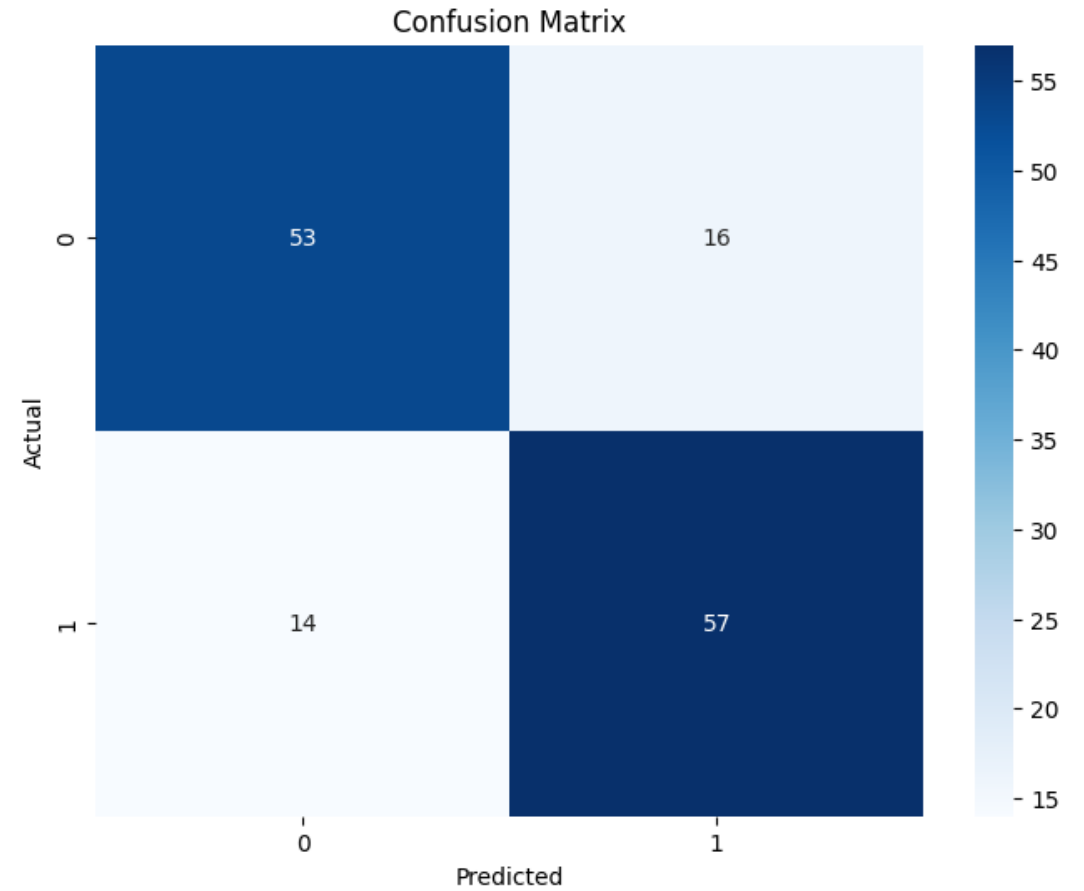
줄넘기 성능 평가

	Precision	Recall	Accuracy	AUC Score	F1 Score
Single	0.7667	0.9857	0.8743	0.9616	0.8625
Double	0.7808	0.8028	0.7857	0.8635	0.7917

Confusion Matrix

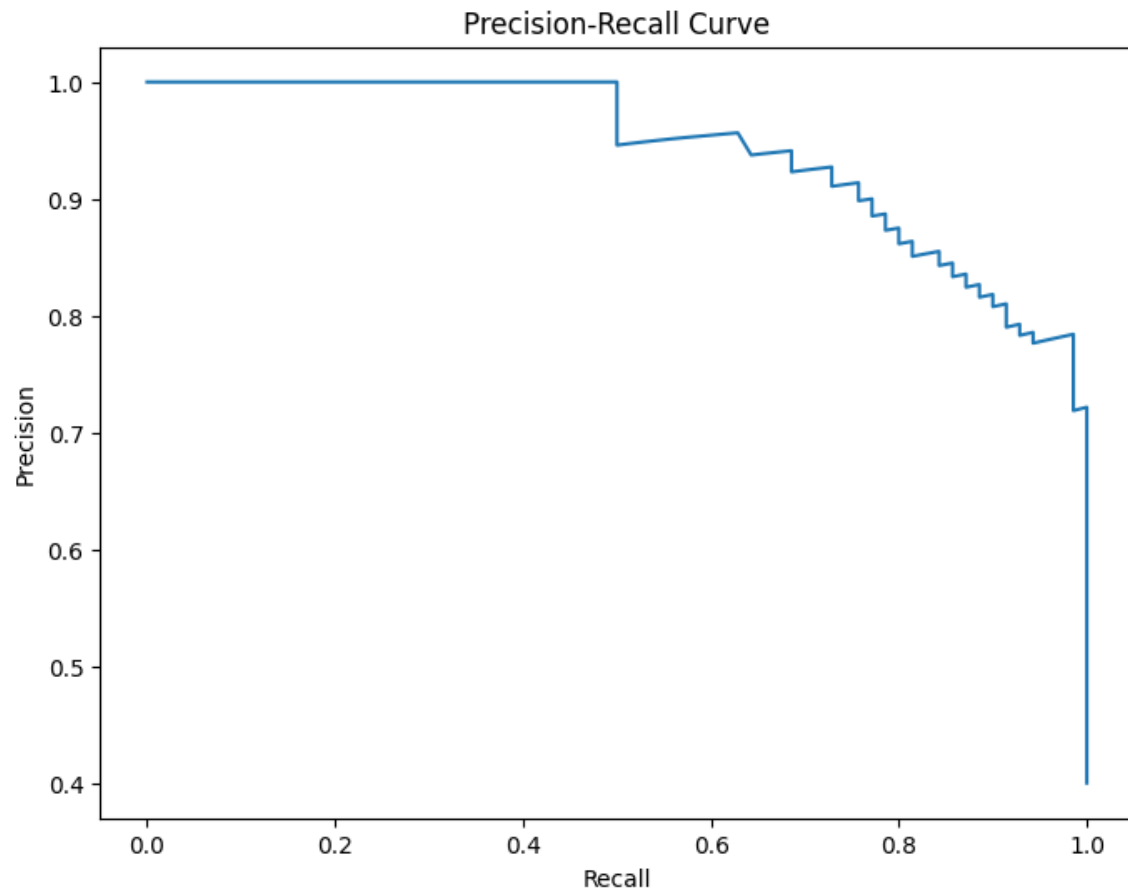


Single Jumprope

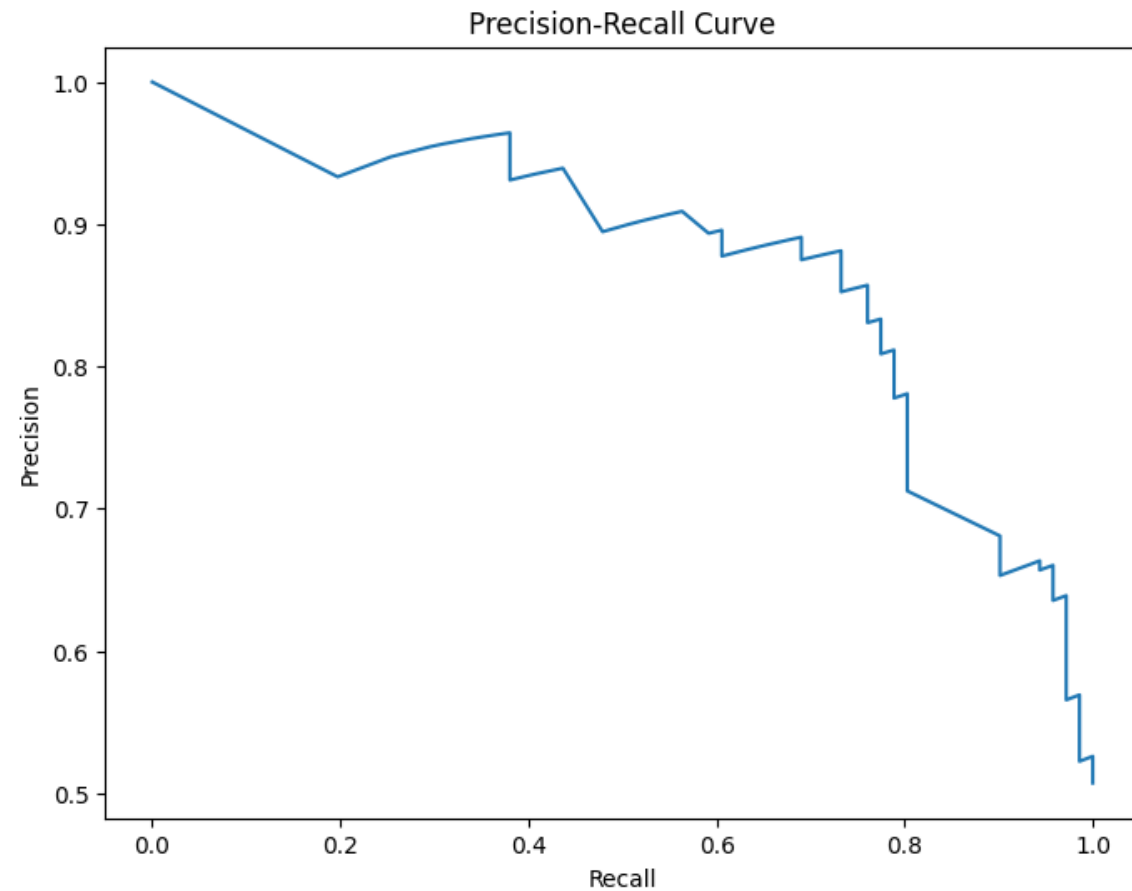


Double Jumprope

PR Curve

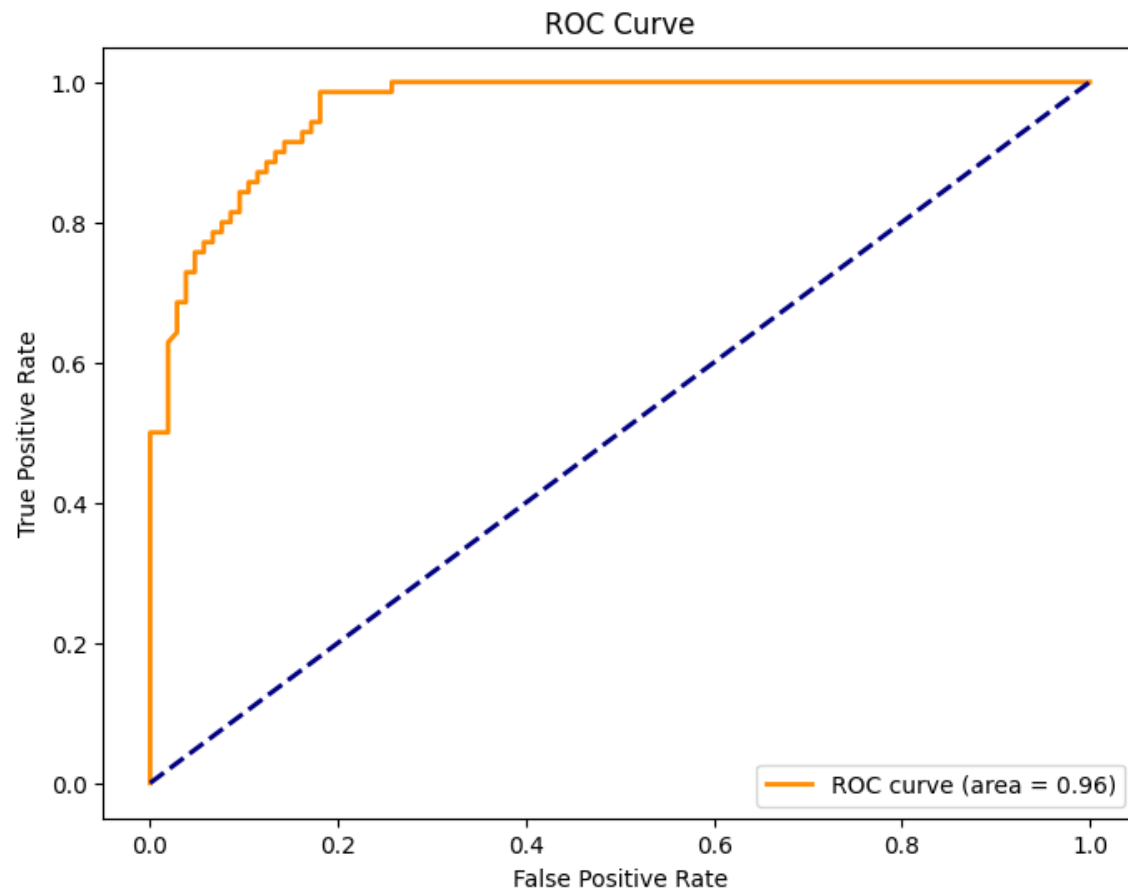


Single Jumprope

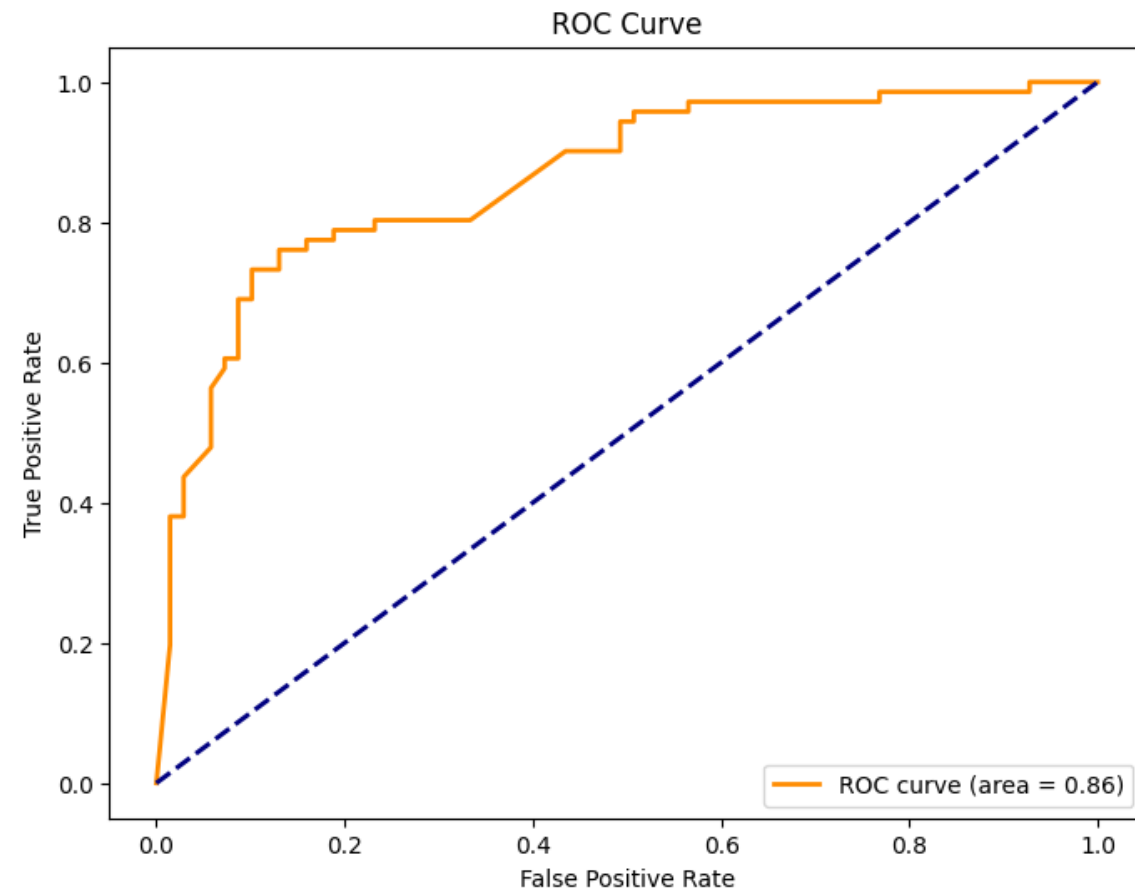


Double Jumprope

ROC Curve

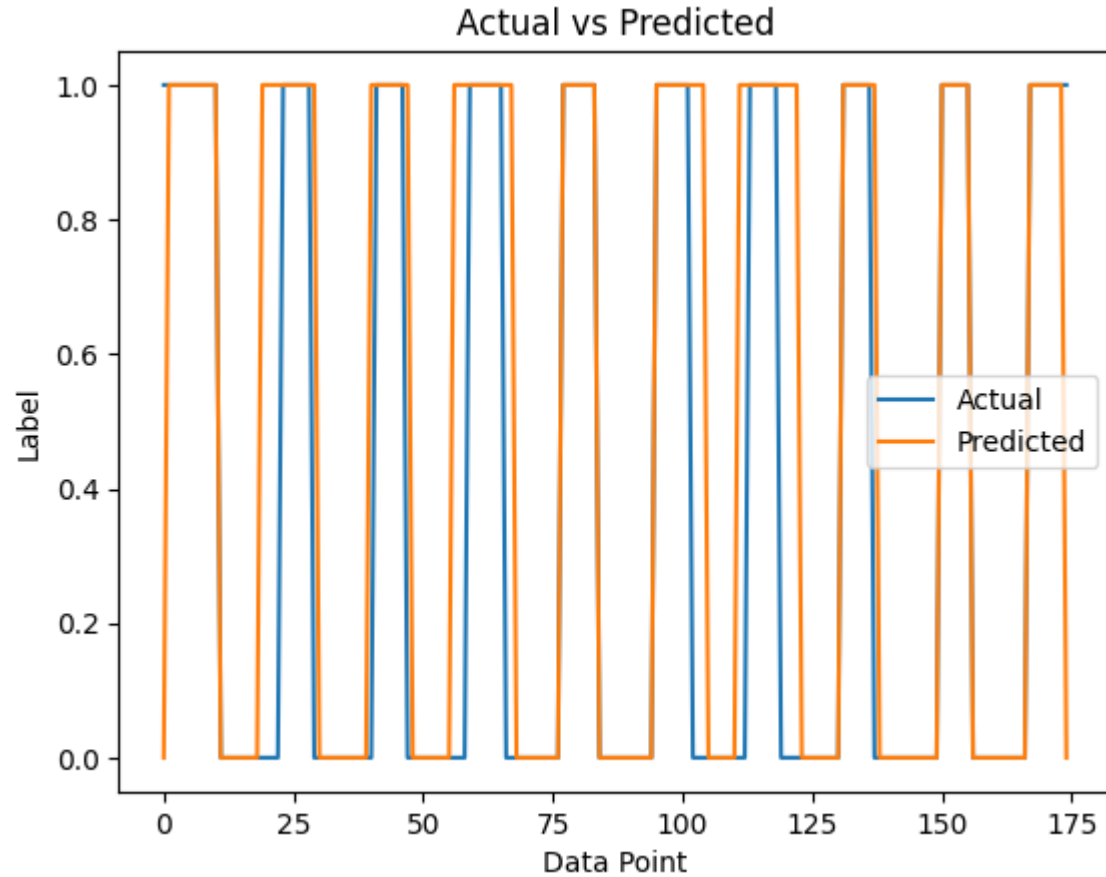


Single Jumprope



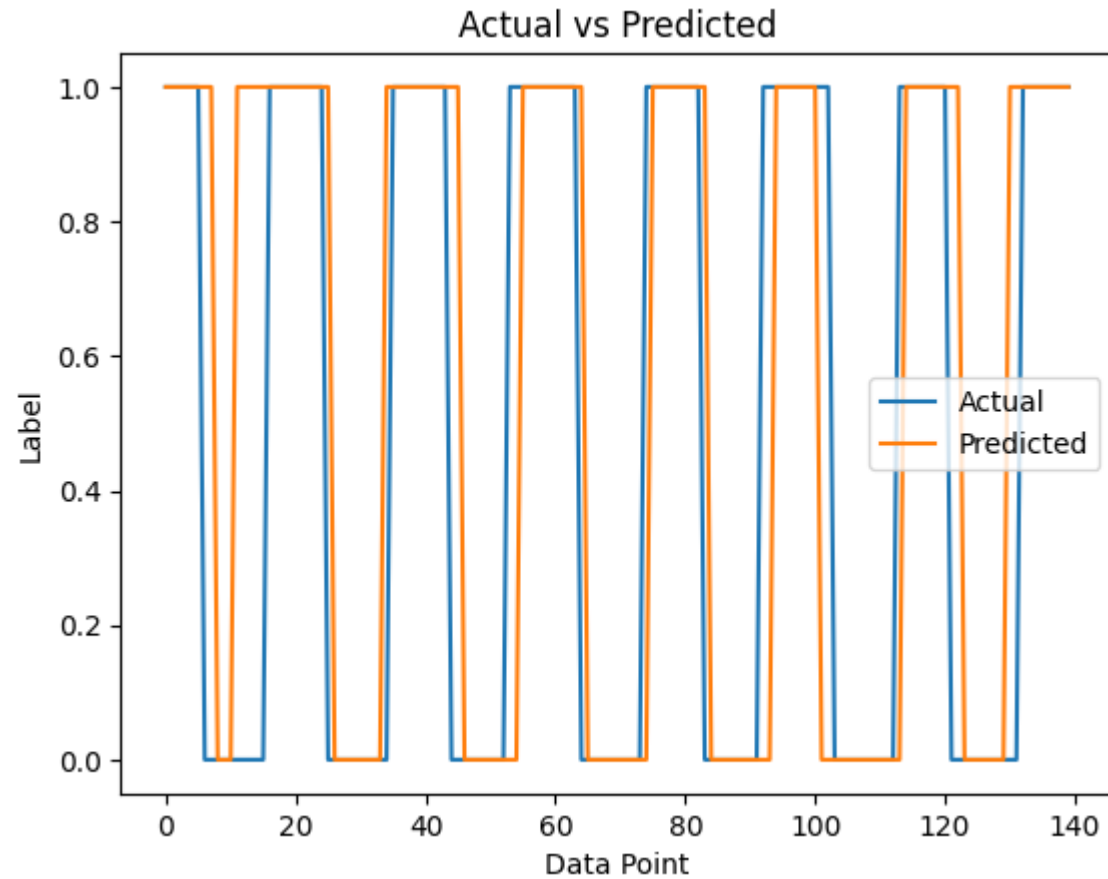
Double Jumprope

일반 줄넘기(single) 예측 결과



Label : 9
Pred : 10

쌍쌍이(double) 예측 결과



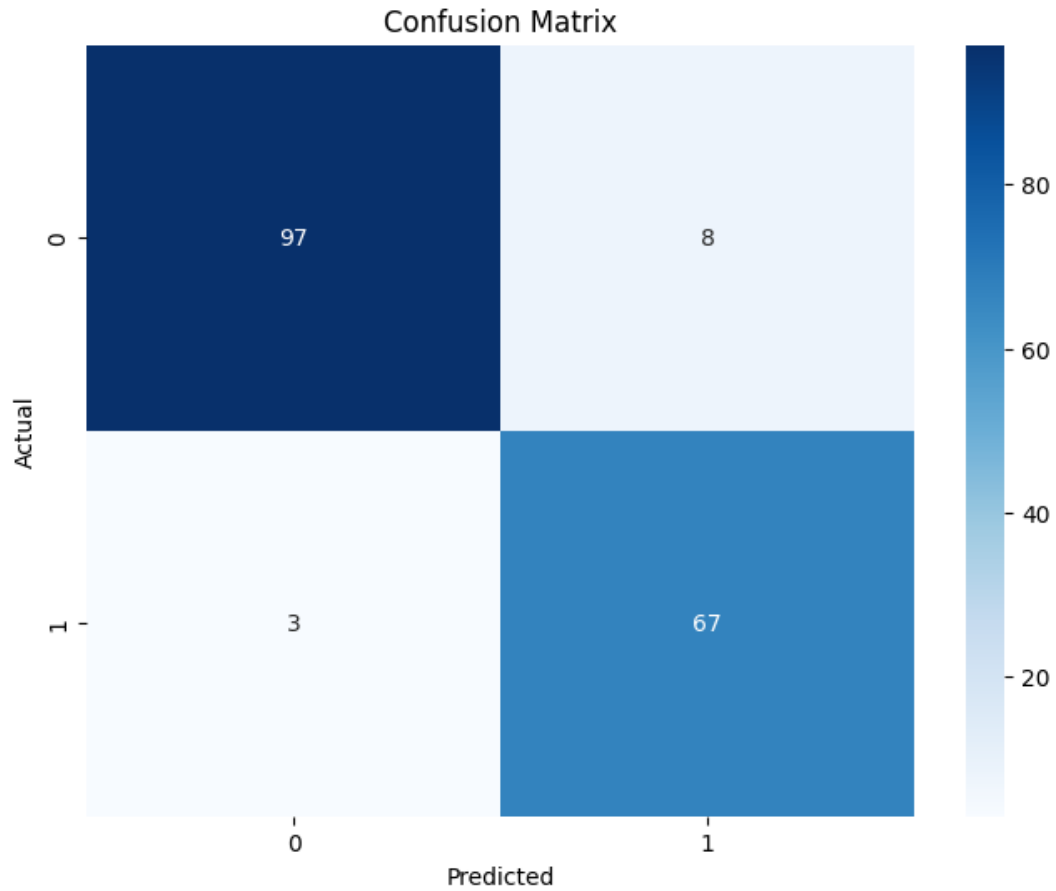
Label : 7
Pred : 7

Support Vector Classifier

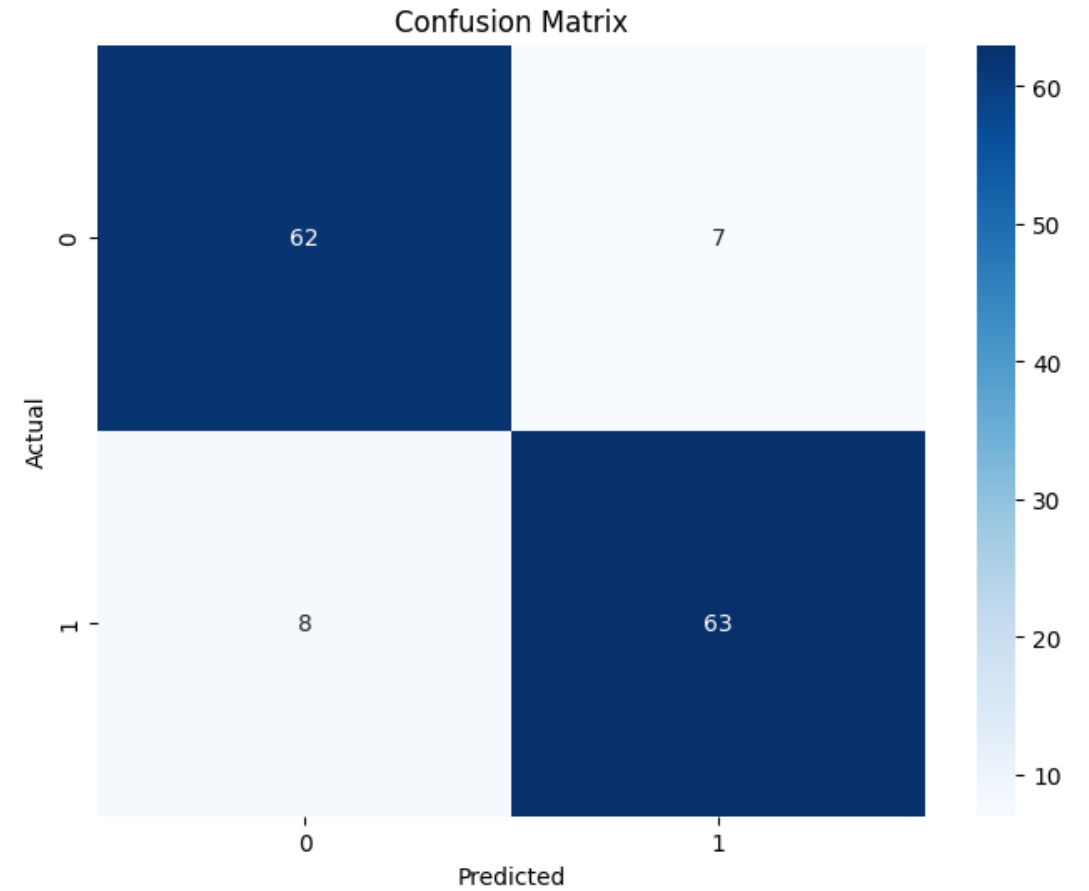
줄넘기 성능 평가

	Precision	Recall	Accuracy	AUC Score	F1 Score
Single	0.8933	0.9571	0.9371	0.9902	0.9371
Double	0.9000	0.8873	0.8929	0.9150	0.8936

Confusion Matrix

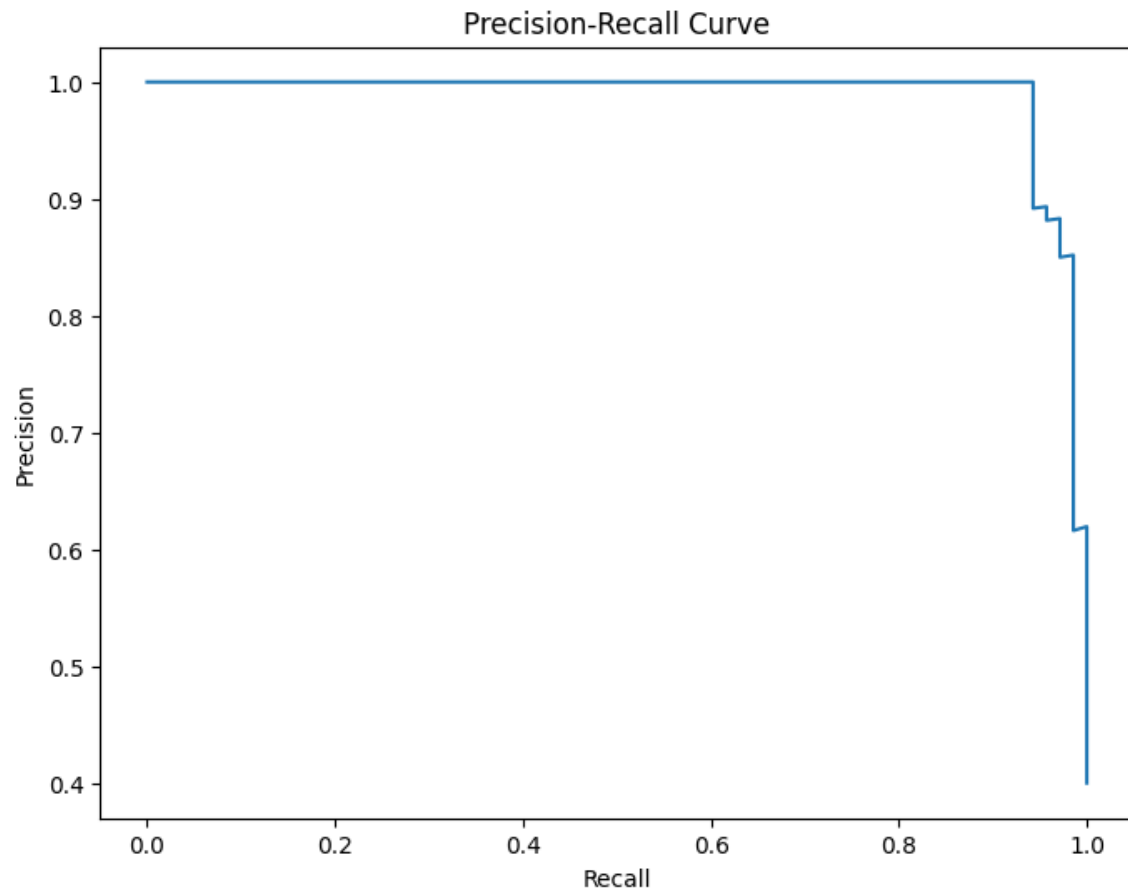


Single Jumprope

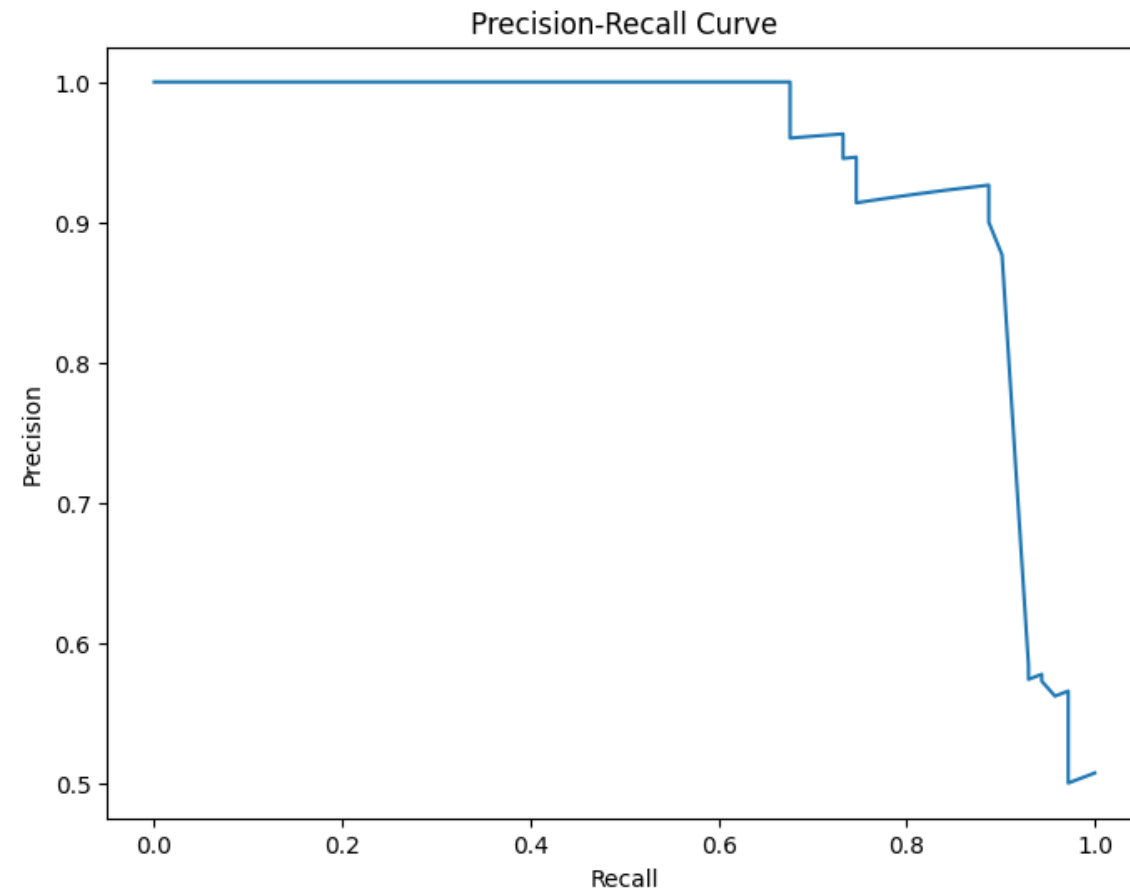


Double Jumprope

PR Curve

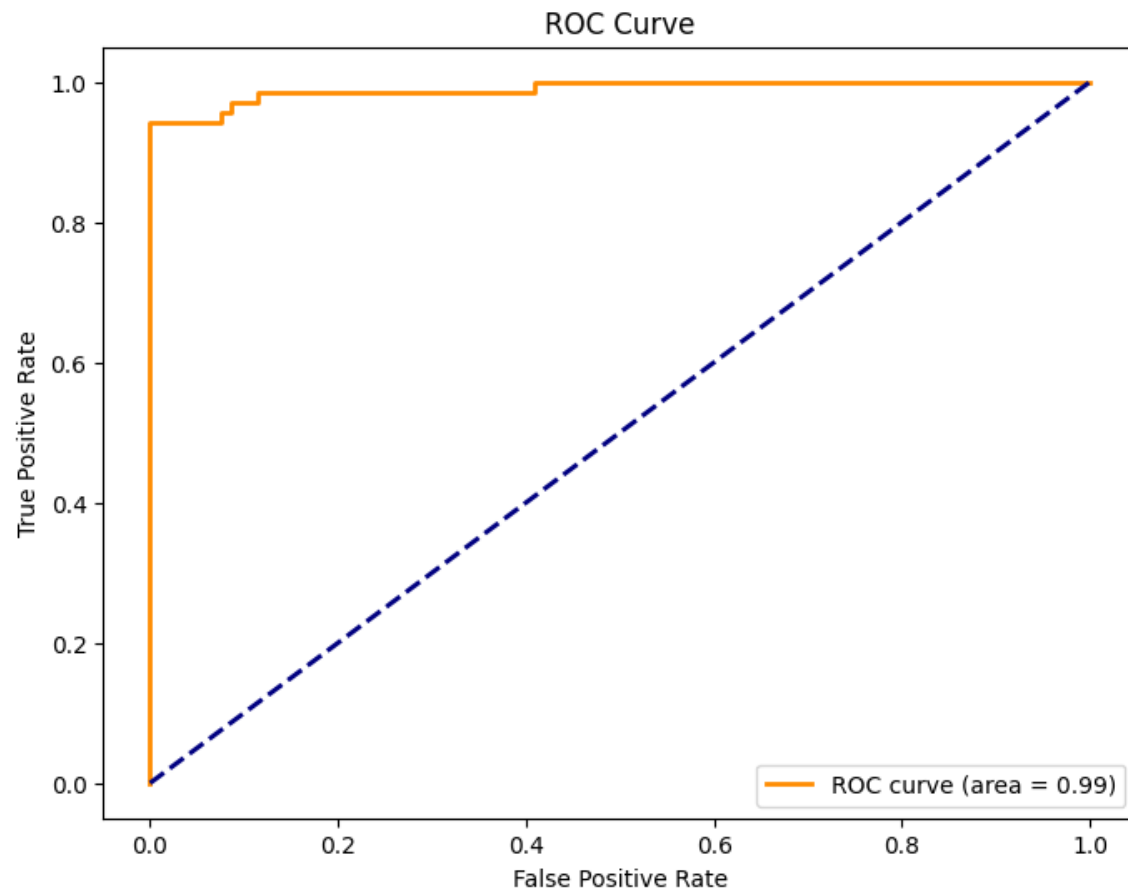


Single Jumprope

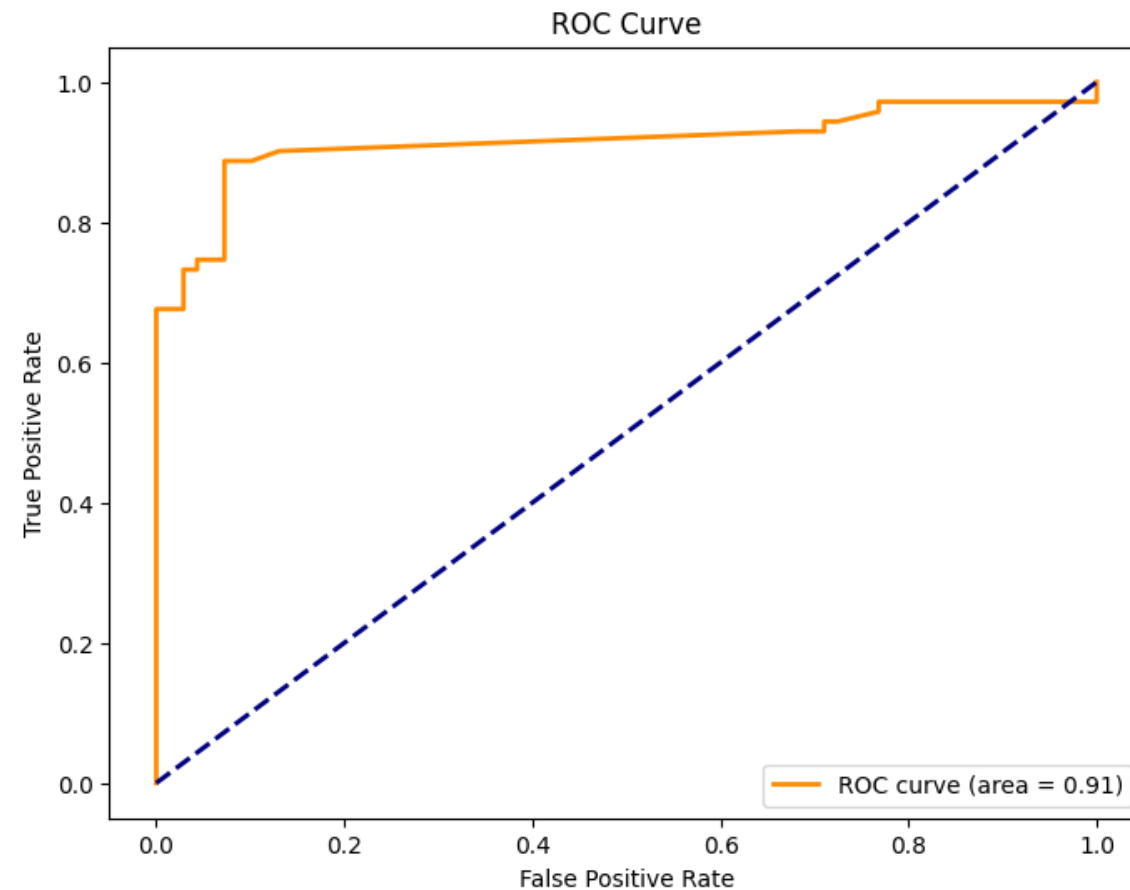


Double Jumprope

ROC Curve

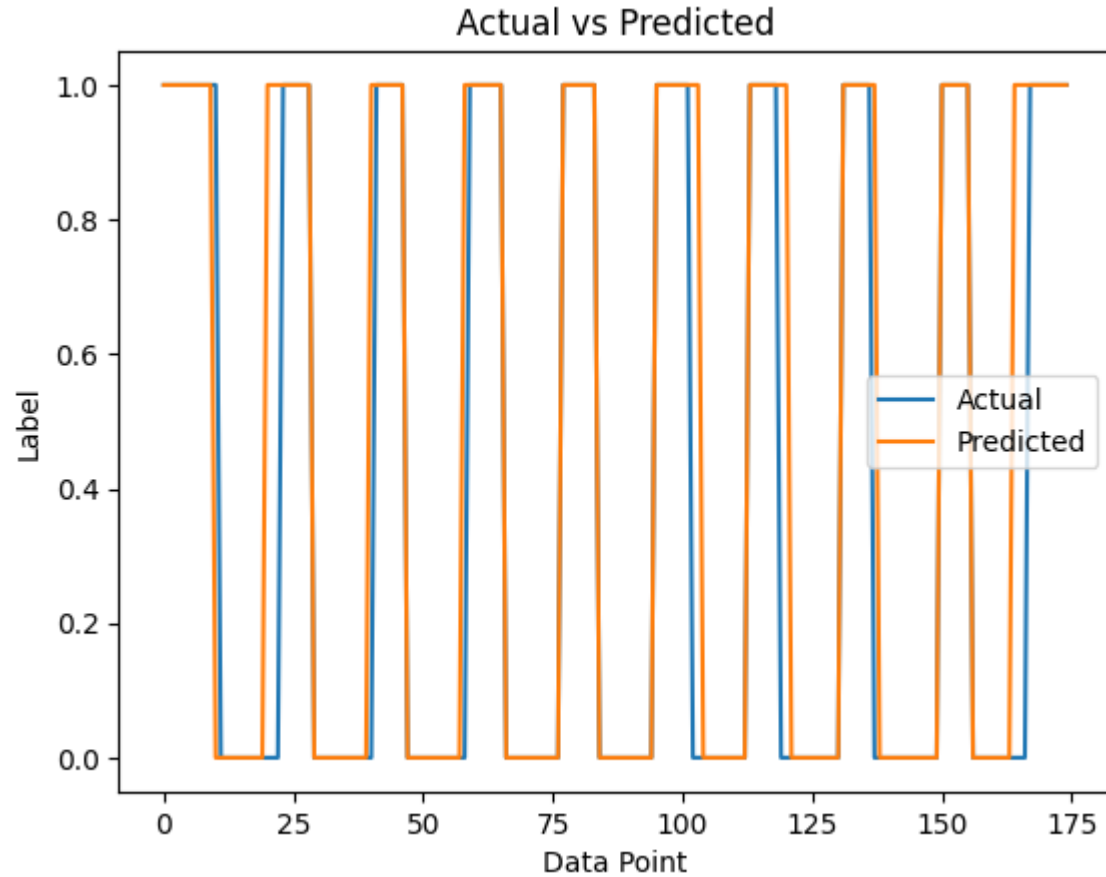


Single Jumprope



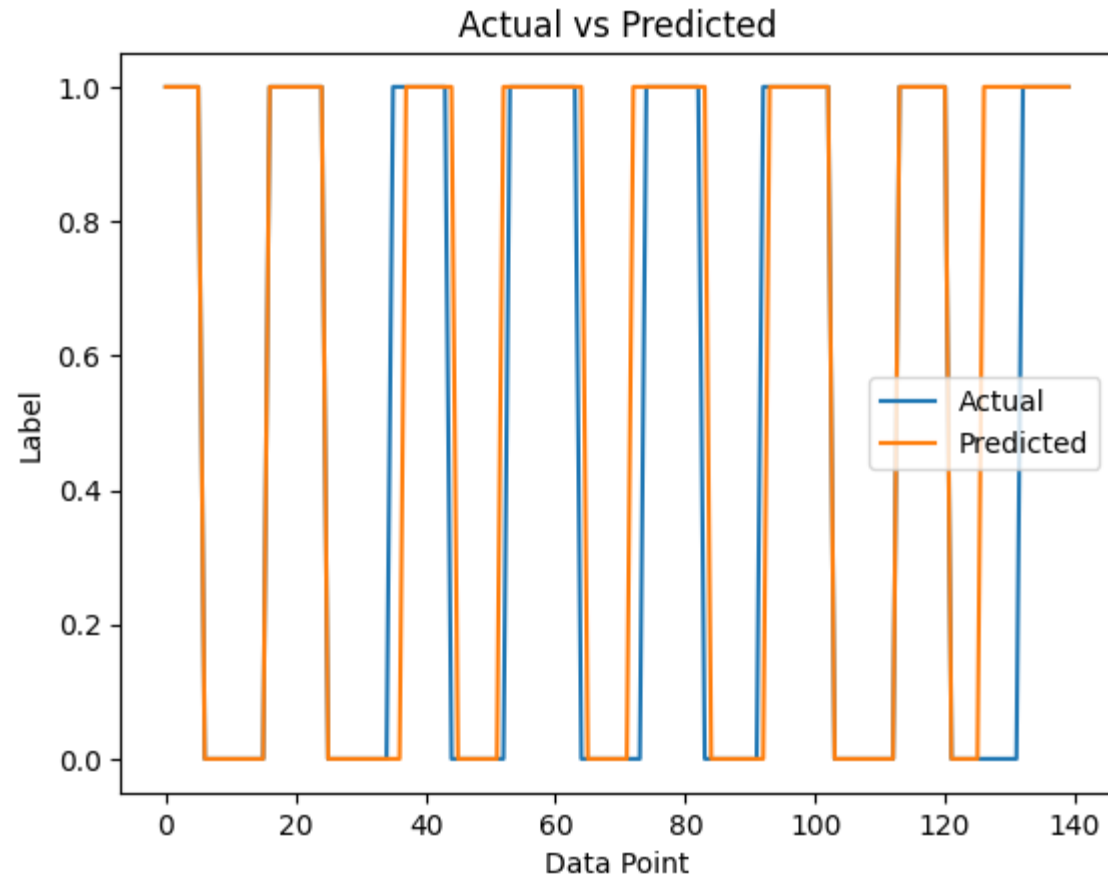
Double Jumprope

일반 줄넘기(single) 예측 결과



Label : 9
Pred : 9

쌍쌍이(double) 예측 결과



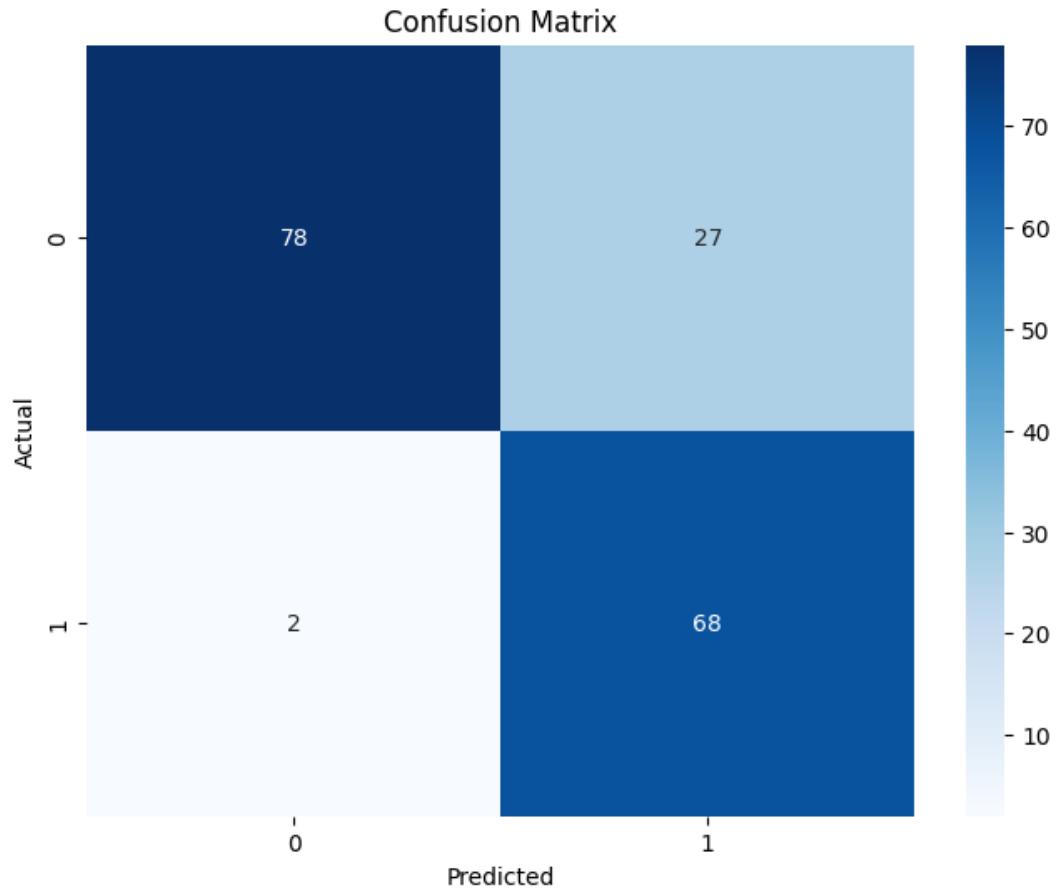
Label : 7
Pred : 7

DNN

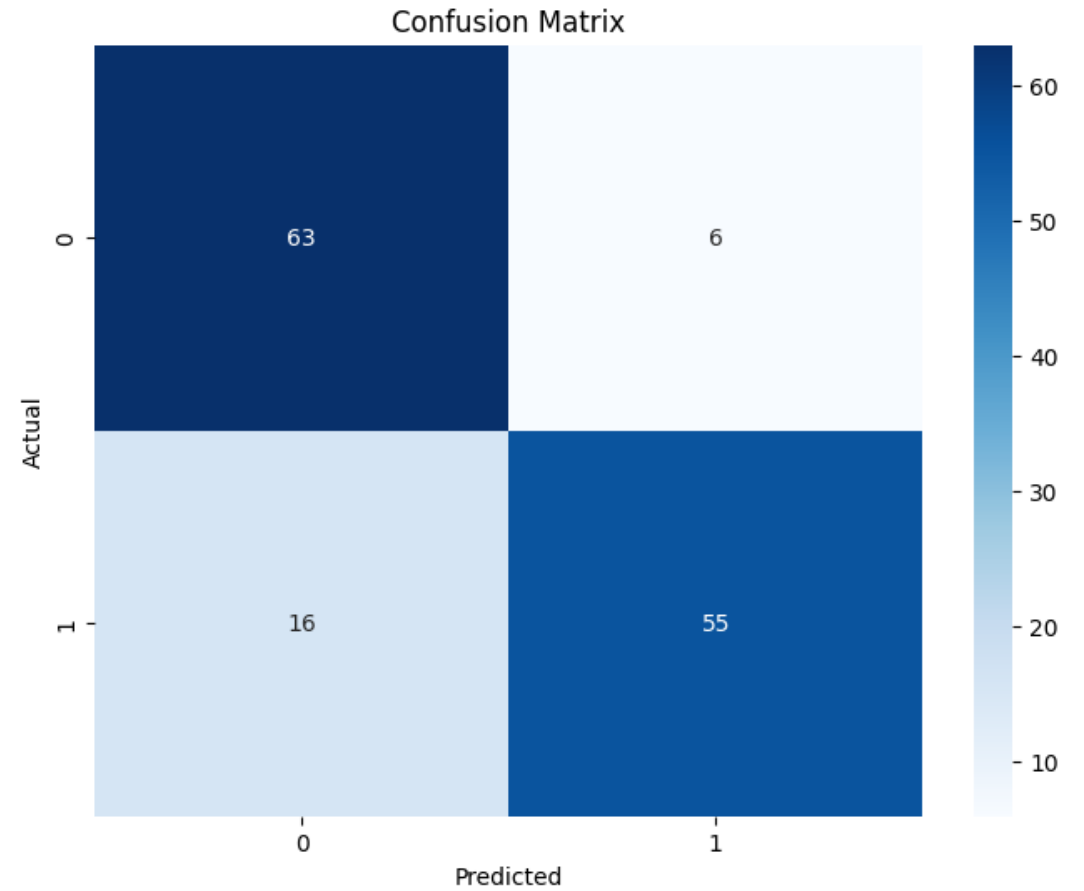
줄넘기 성능 평가

	Precision	Recall	Accuracy	AUC Score	F1 Score
Single	0.7158	0.9714	0.8343	0.8571	0.8242
Double	0.9016	0.7746	0.8429	0.8438	0.8333

Confusion Matrix

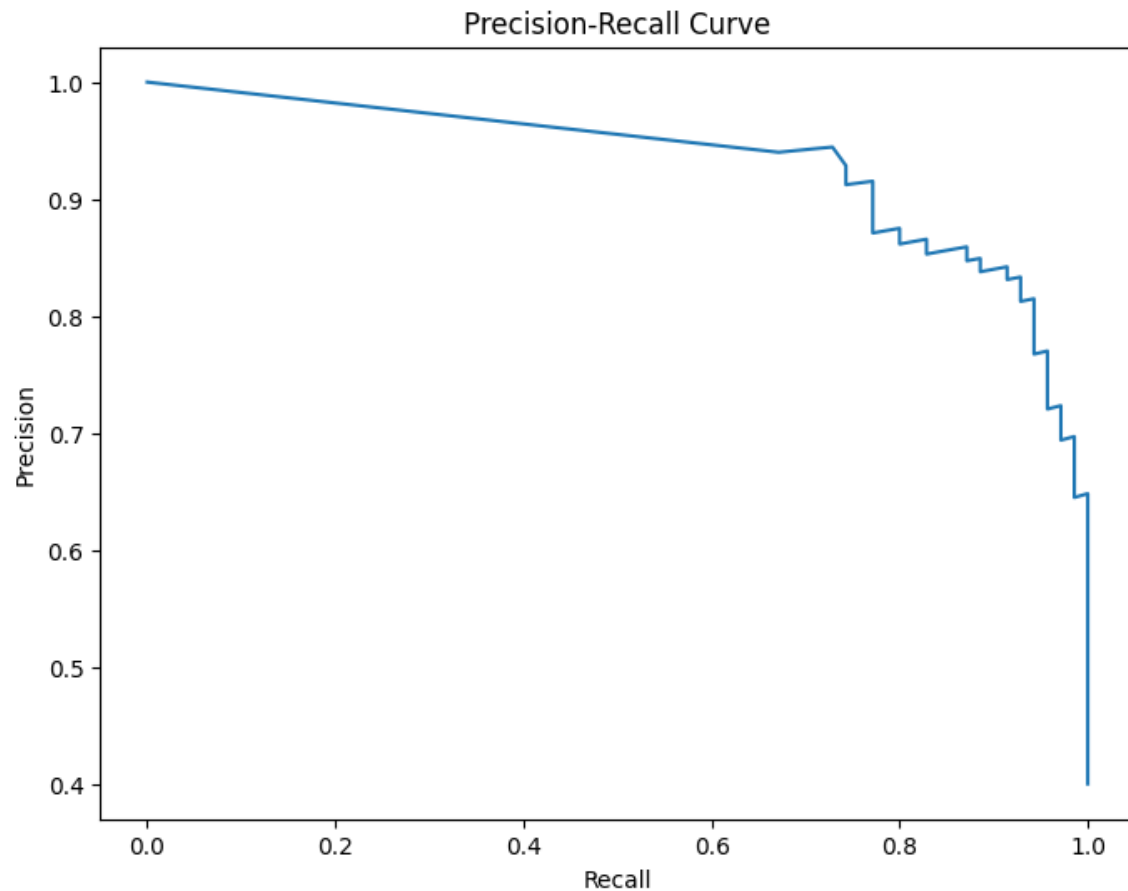


Single Jumprope

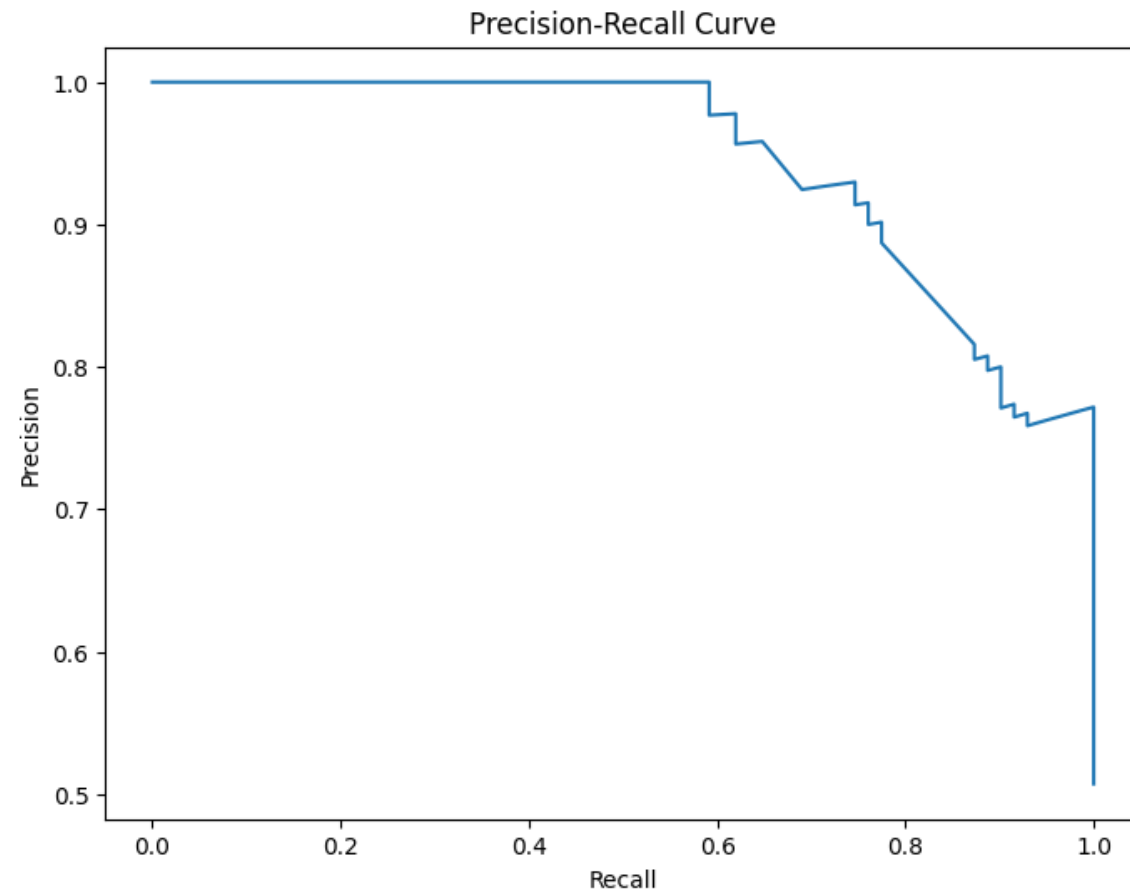


Double Jumprope

PR Curve

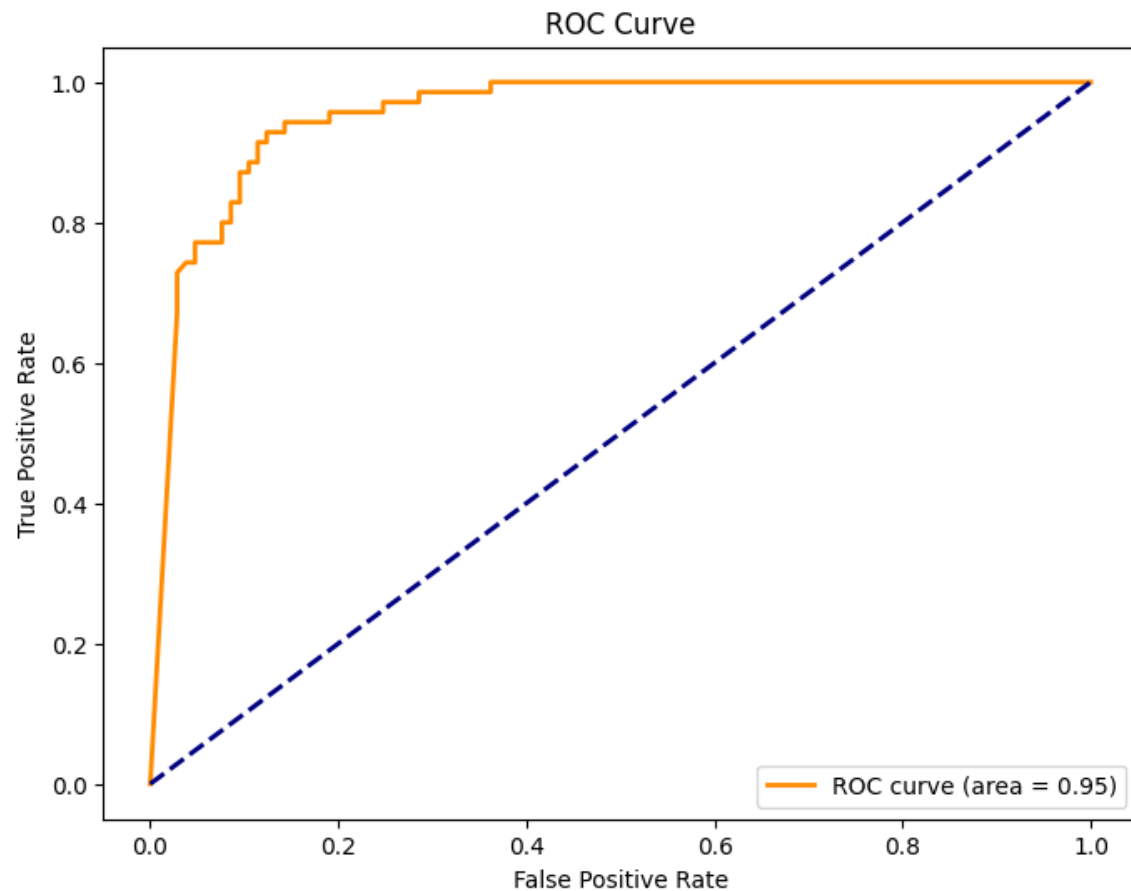


Single Jumprope

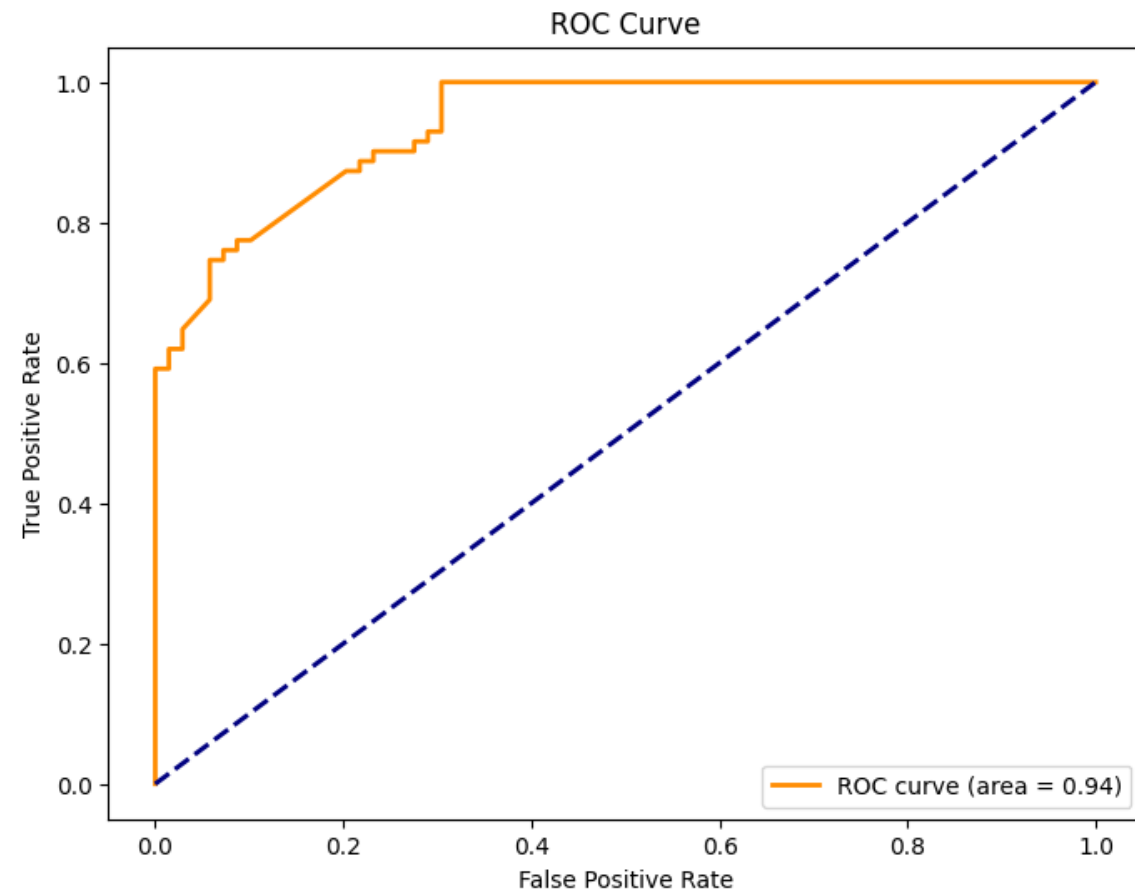


Double Jumprope

ROC Curve

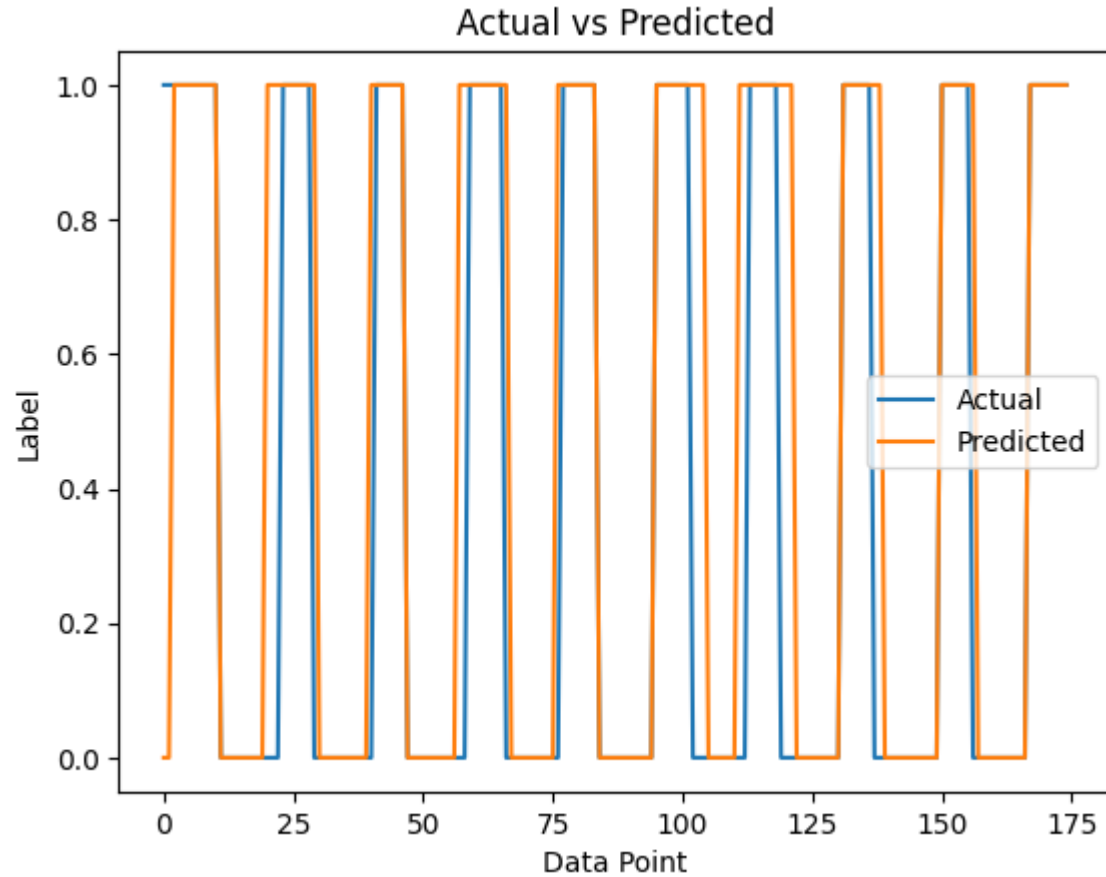


Single Jumprope



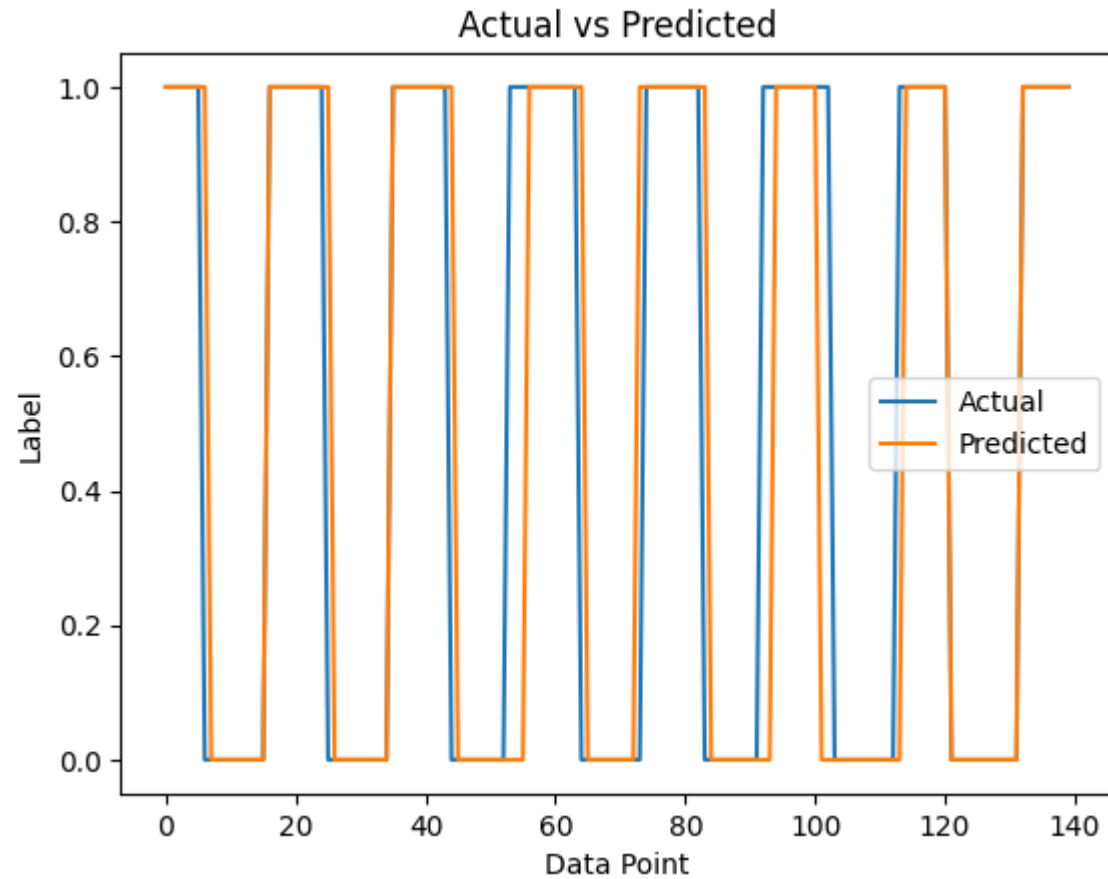
Double Jumprope

일반 줄넘기(single) 예측 결과



Label : 9
Pred : 10

쌍쌍이(double) 예측 결과



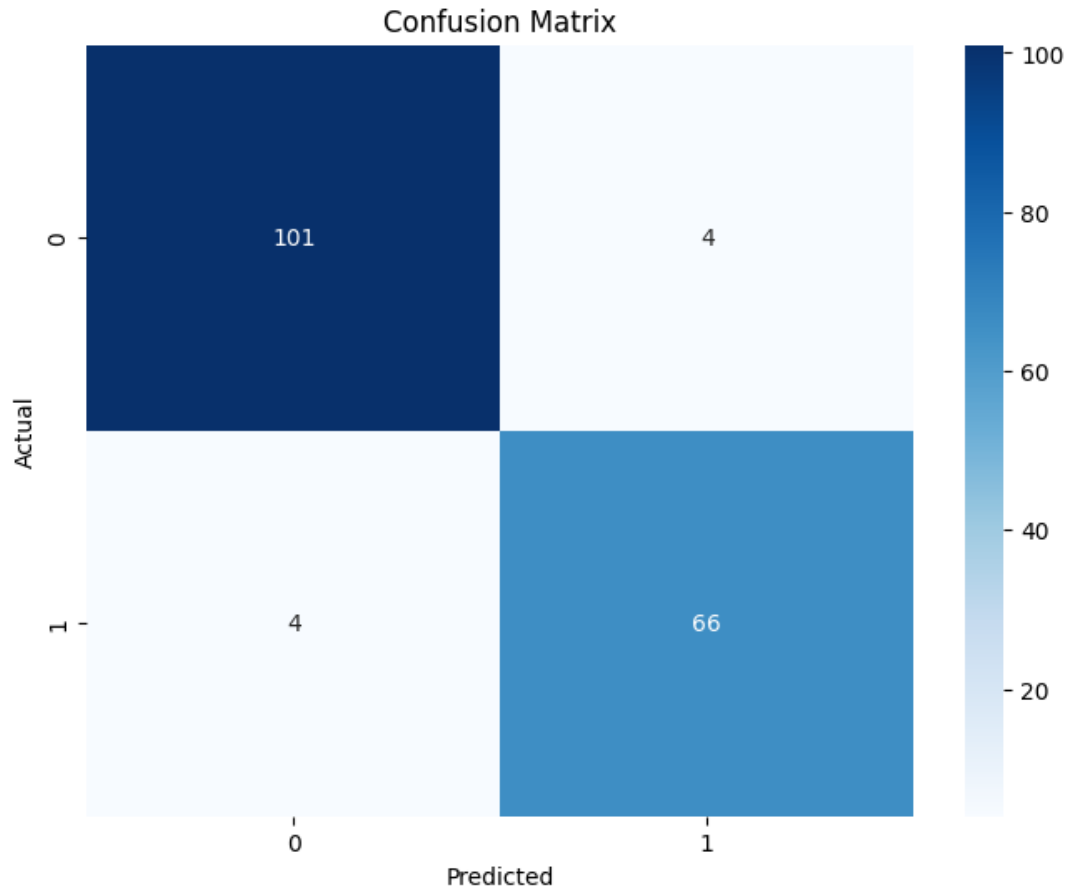
Label : 7
Pred : 7

LSTM

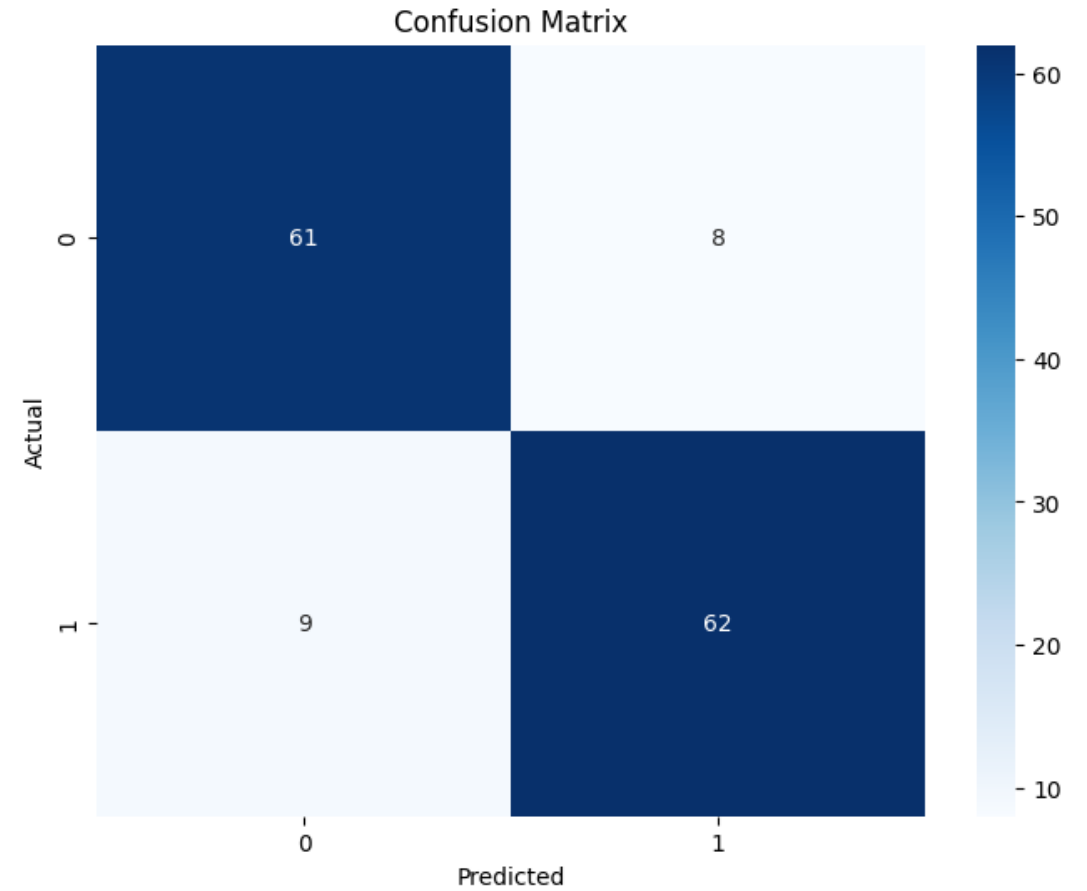
줄넘기 성능 평가

	Precision	Recall	Accuracy	AUC Score	F1 Score
Single	0.9429	0.9429	0.9543	0.9524	0.9429
Double	0.8857	0.8732	0.8786	0.8787	0.8794

Confusion Matrix

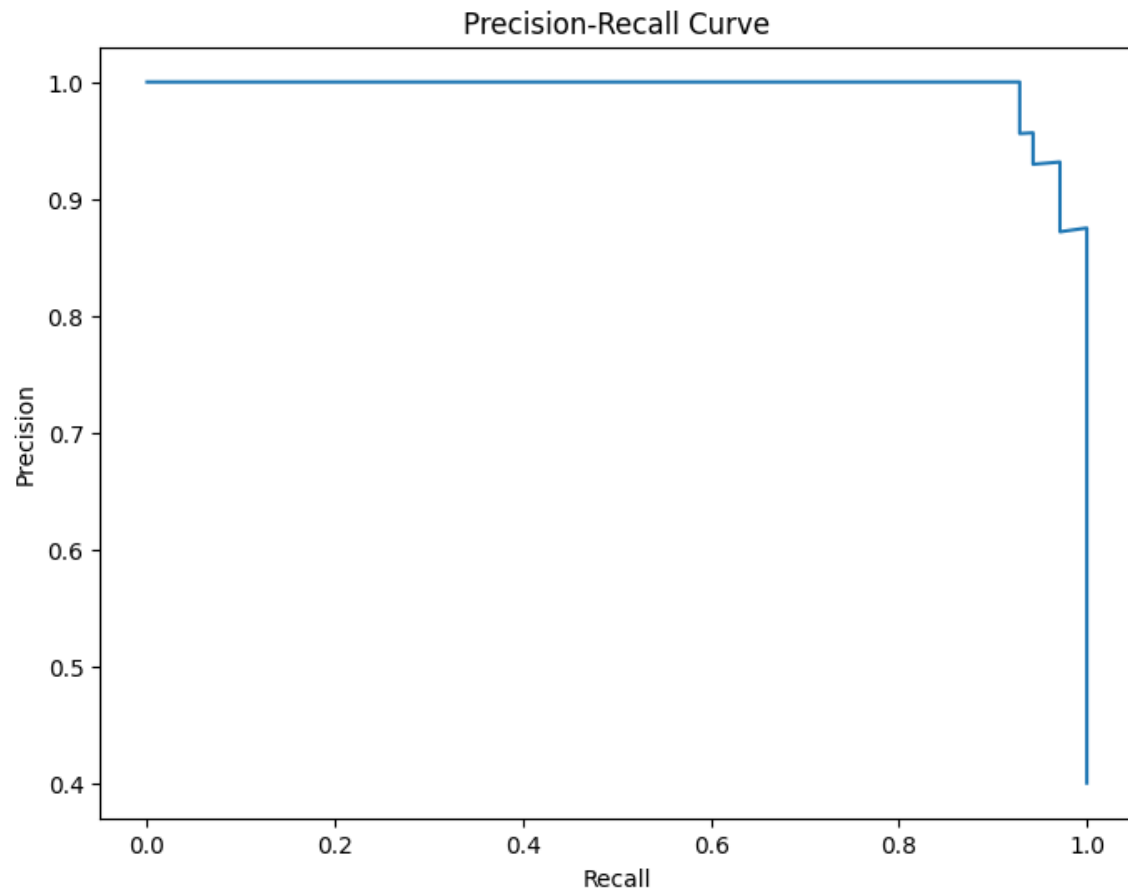


Single Jumprope

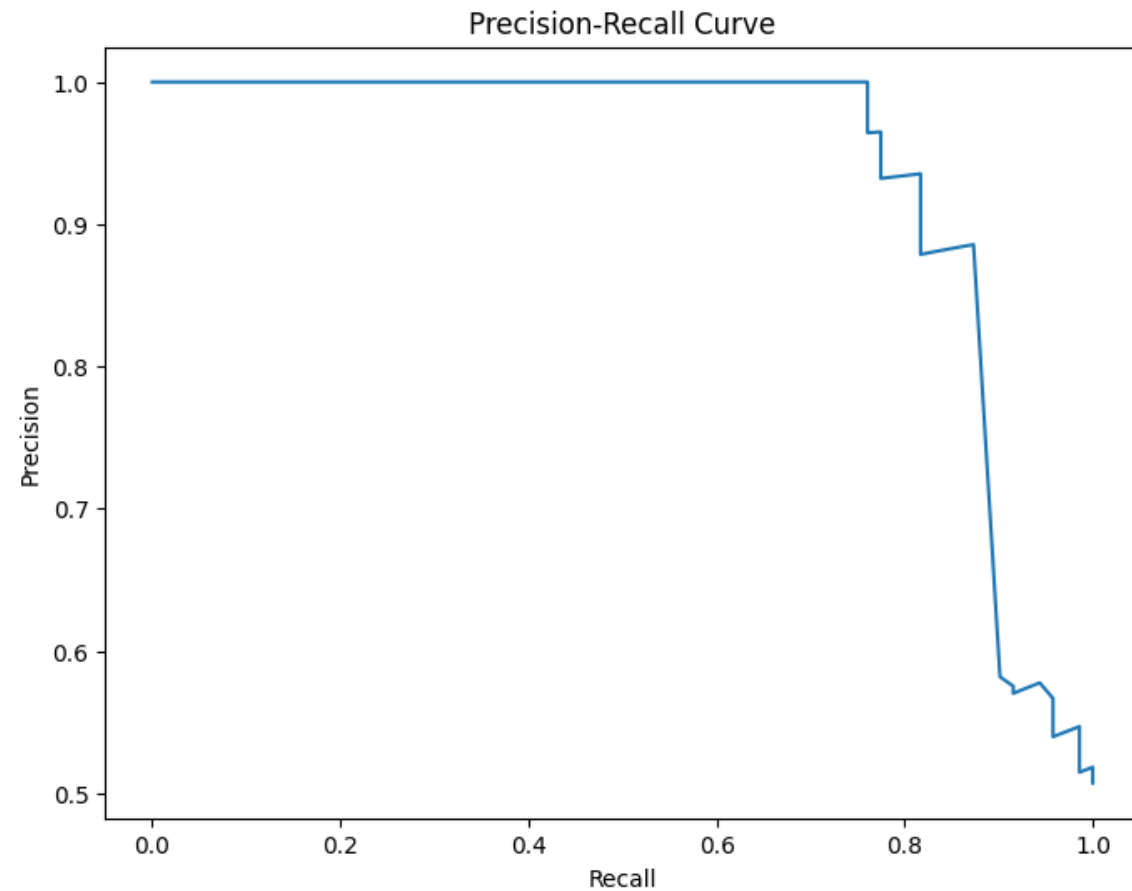


Double Jumprope

PR Curve

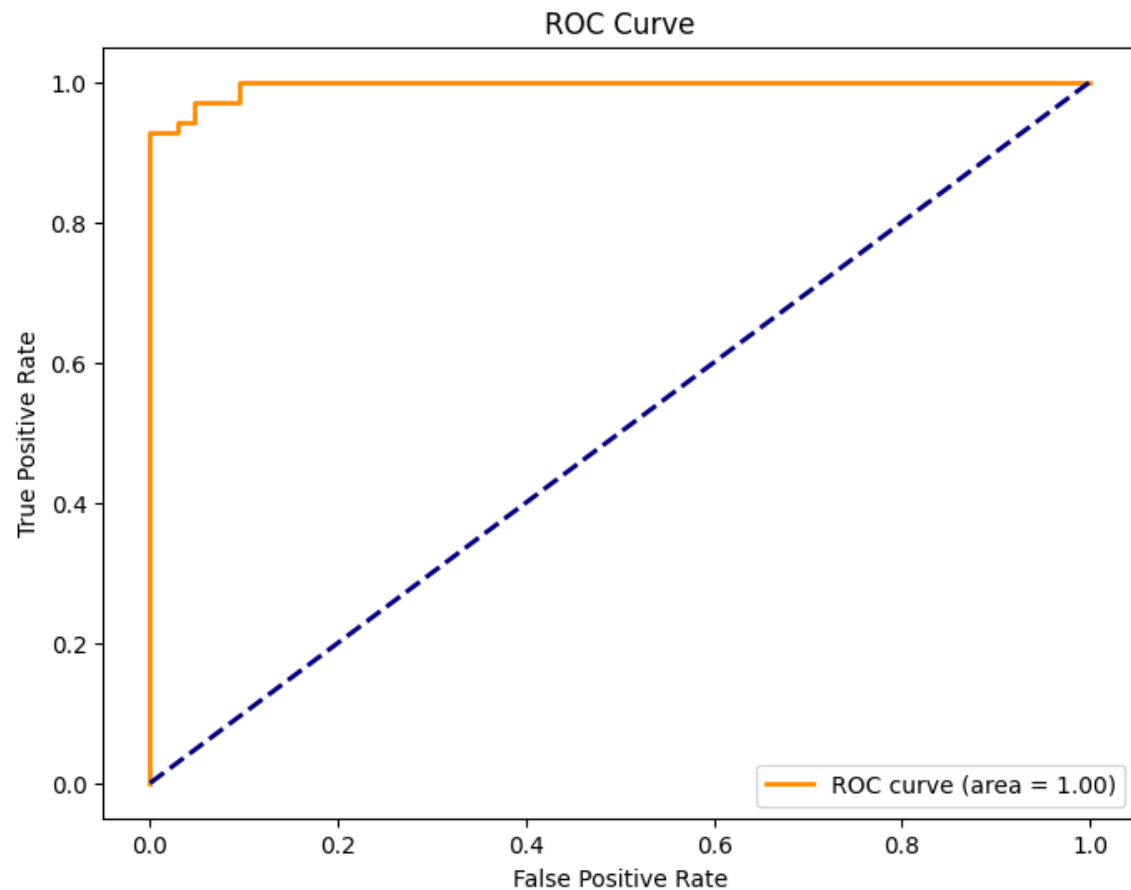


Single Jumprope

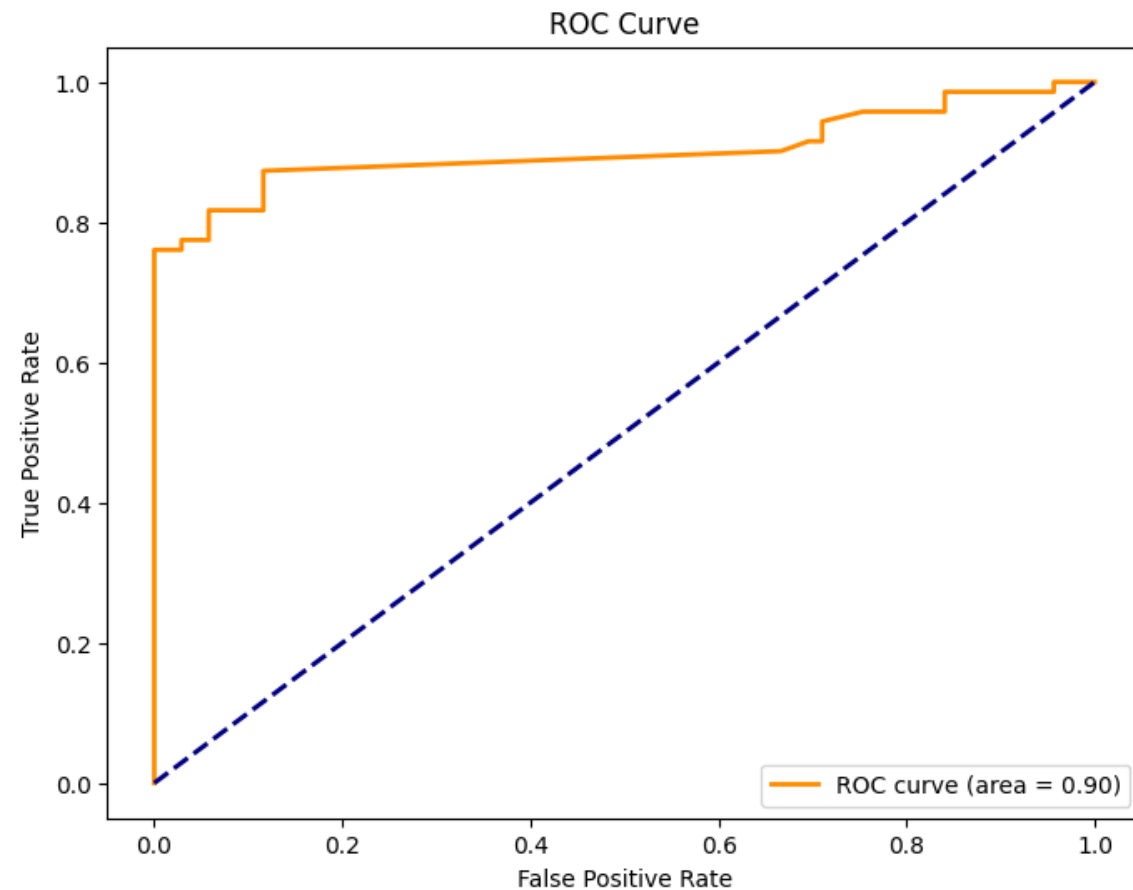


Double Jumprope

ROC Curve

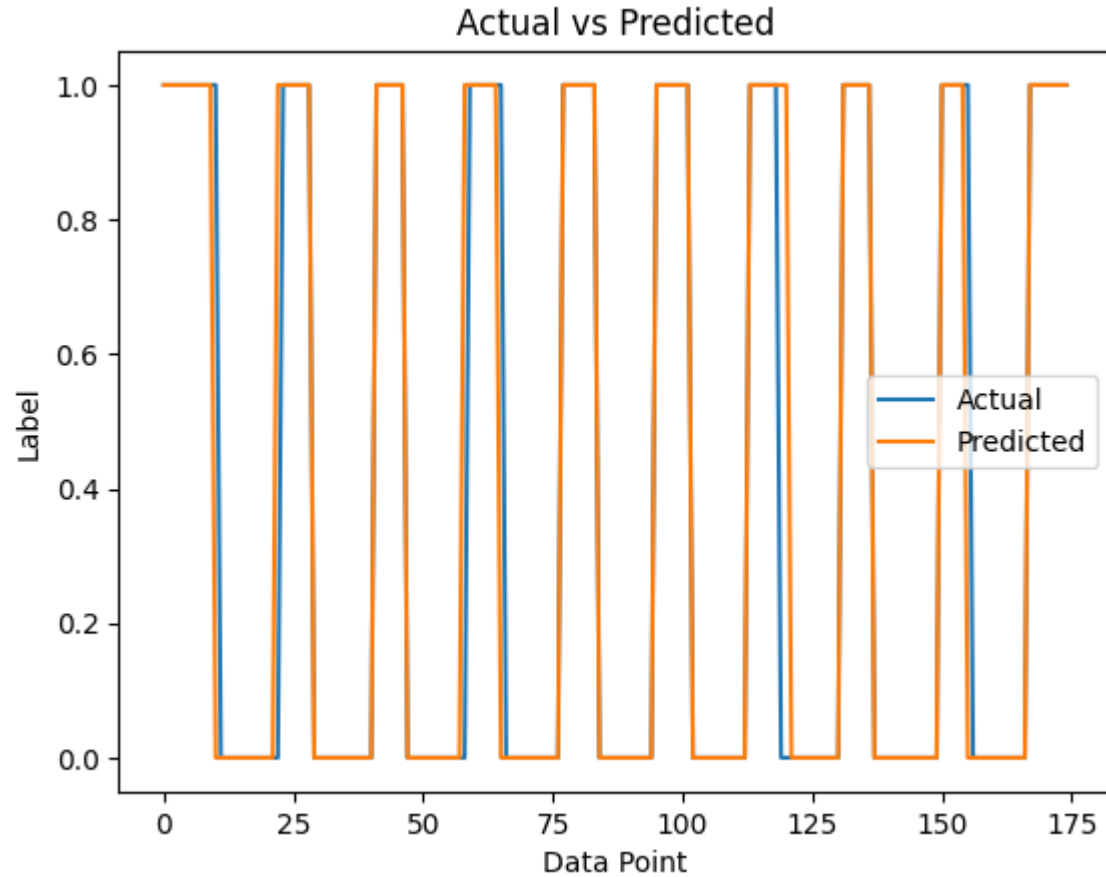


Single Jumprope



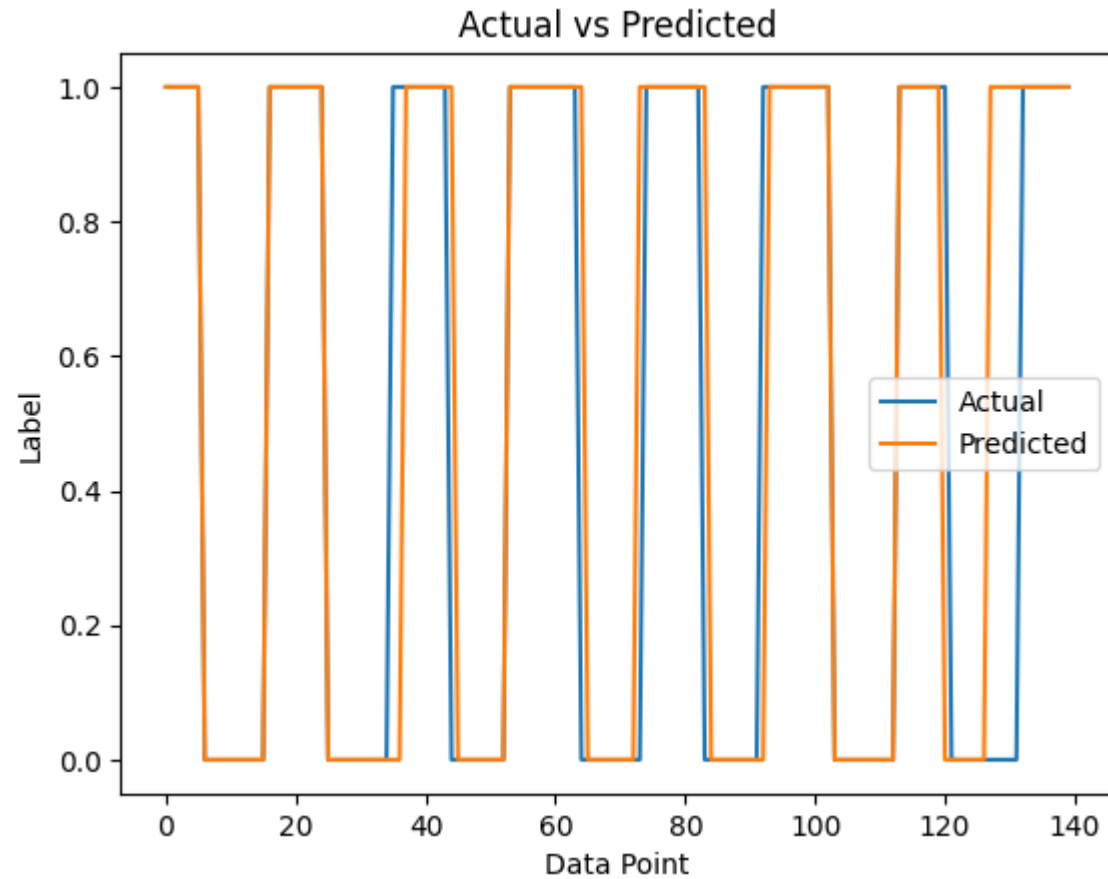
Double Jumprope

일반 줄넘기(single) 예측 결과



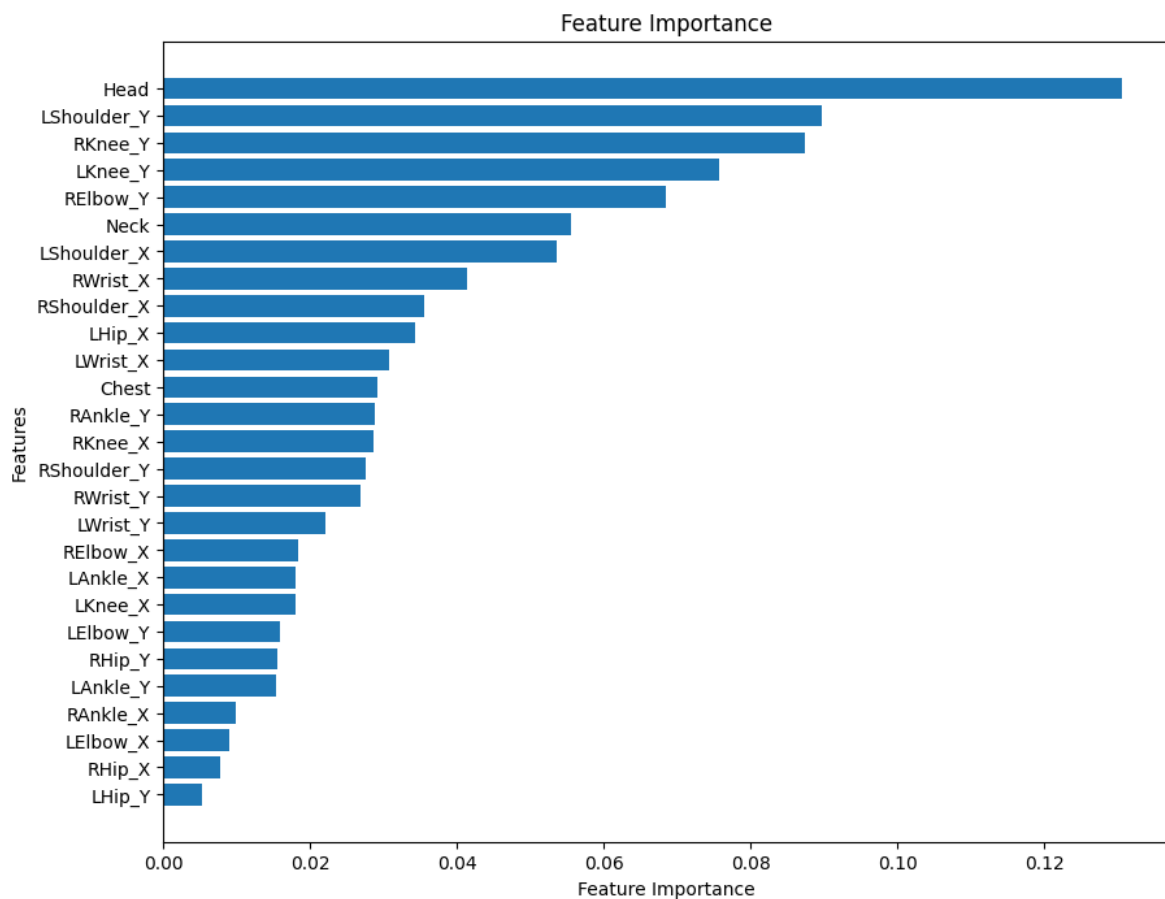
Label : 9
Pred : 9

쌍쌍이(double) 예측 결과

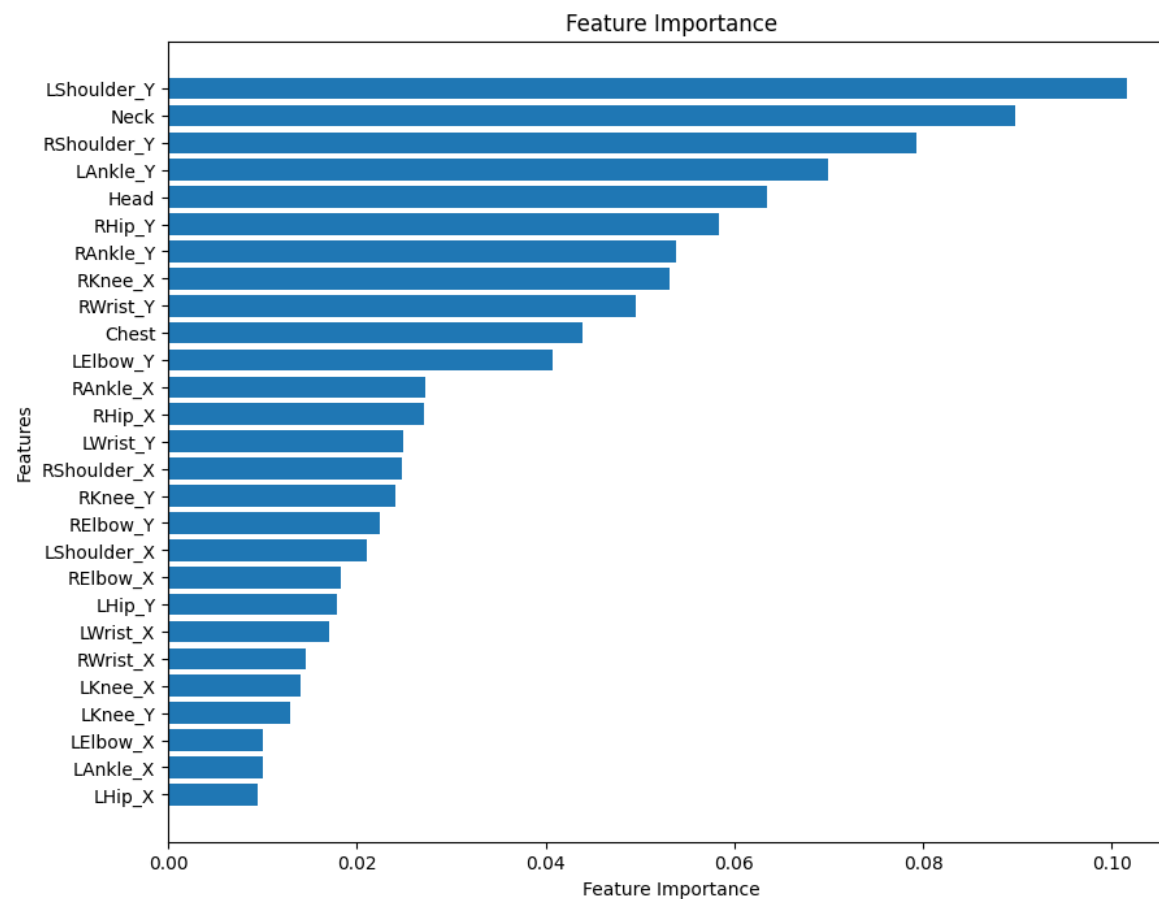


Label : 7
Pred : 7

Feature Importance

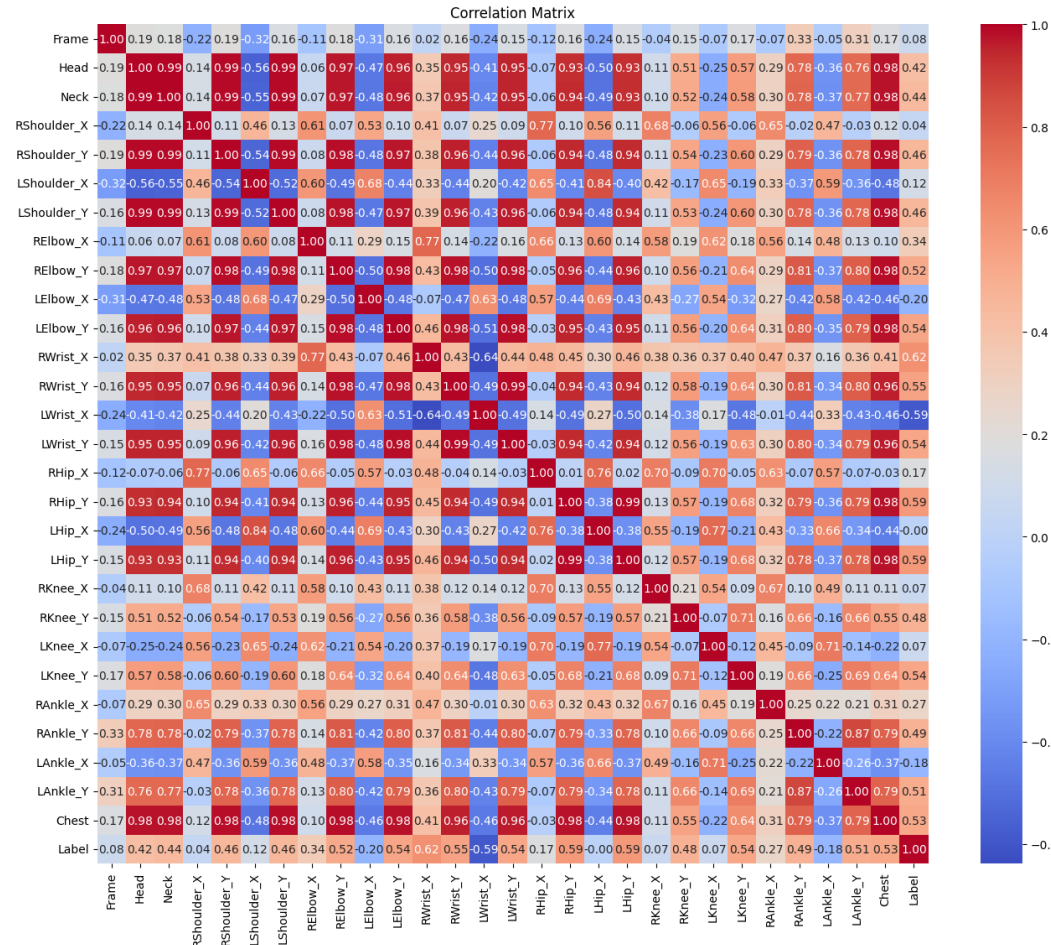


Single Jump rope

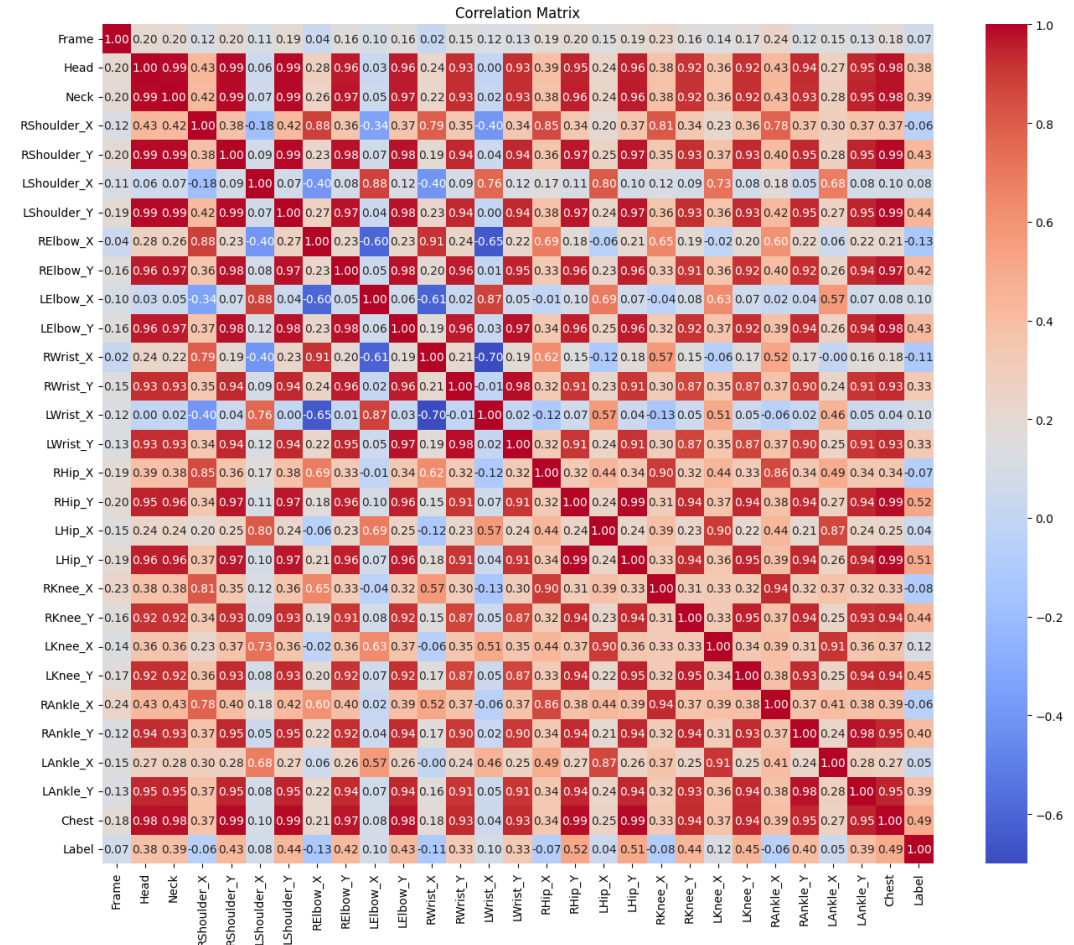


Double Jump rope

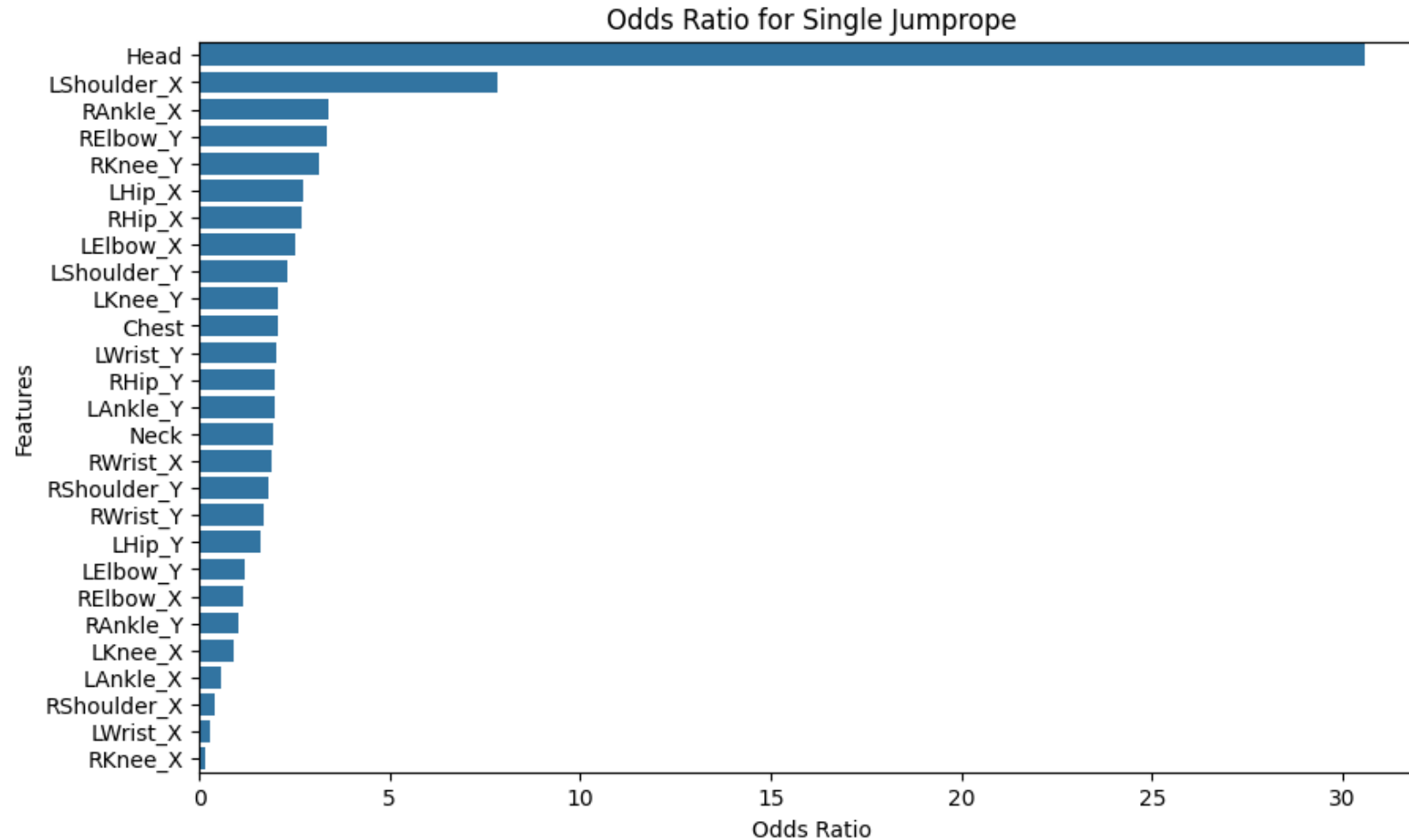
Correlation Matrix



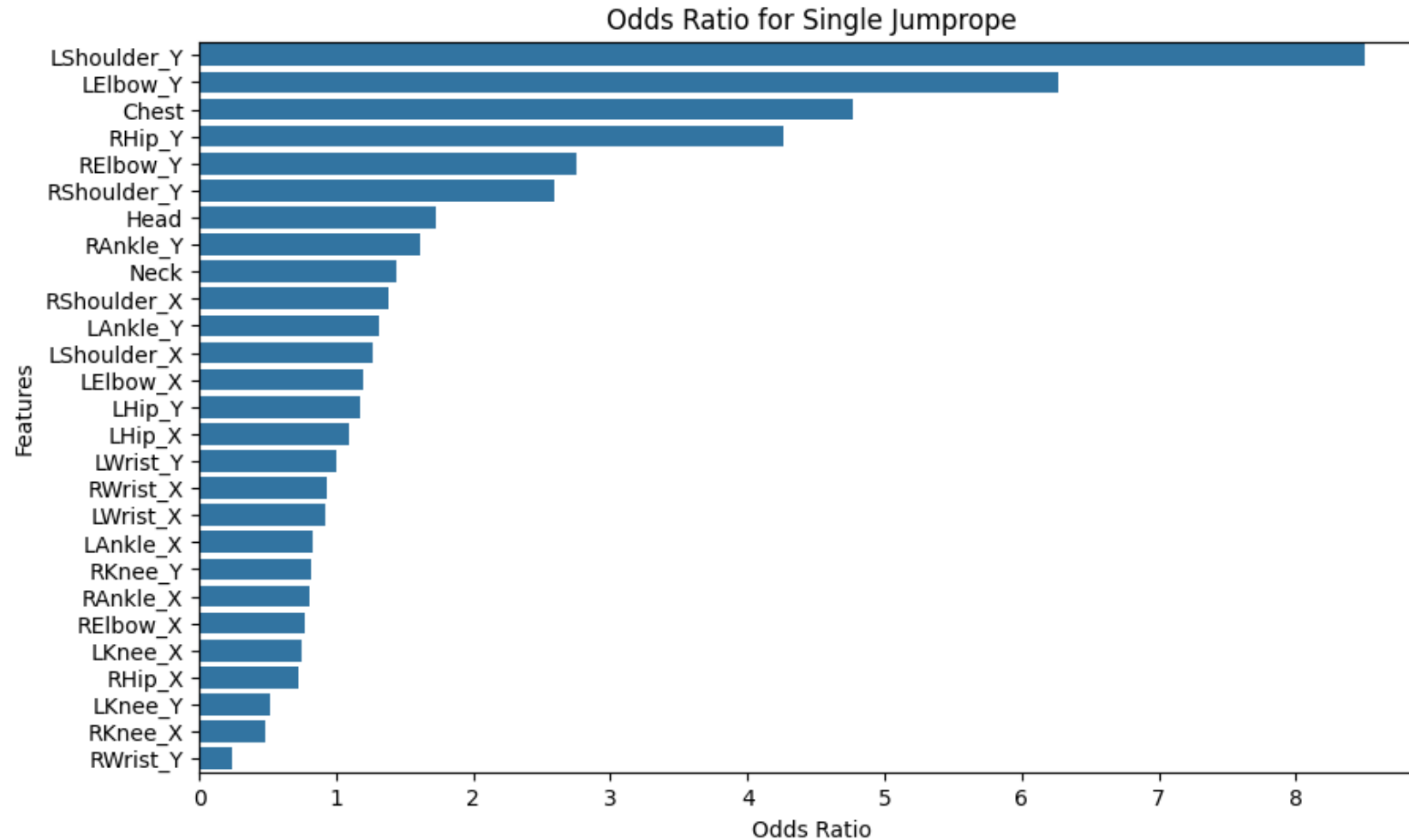
Single



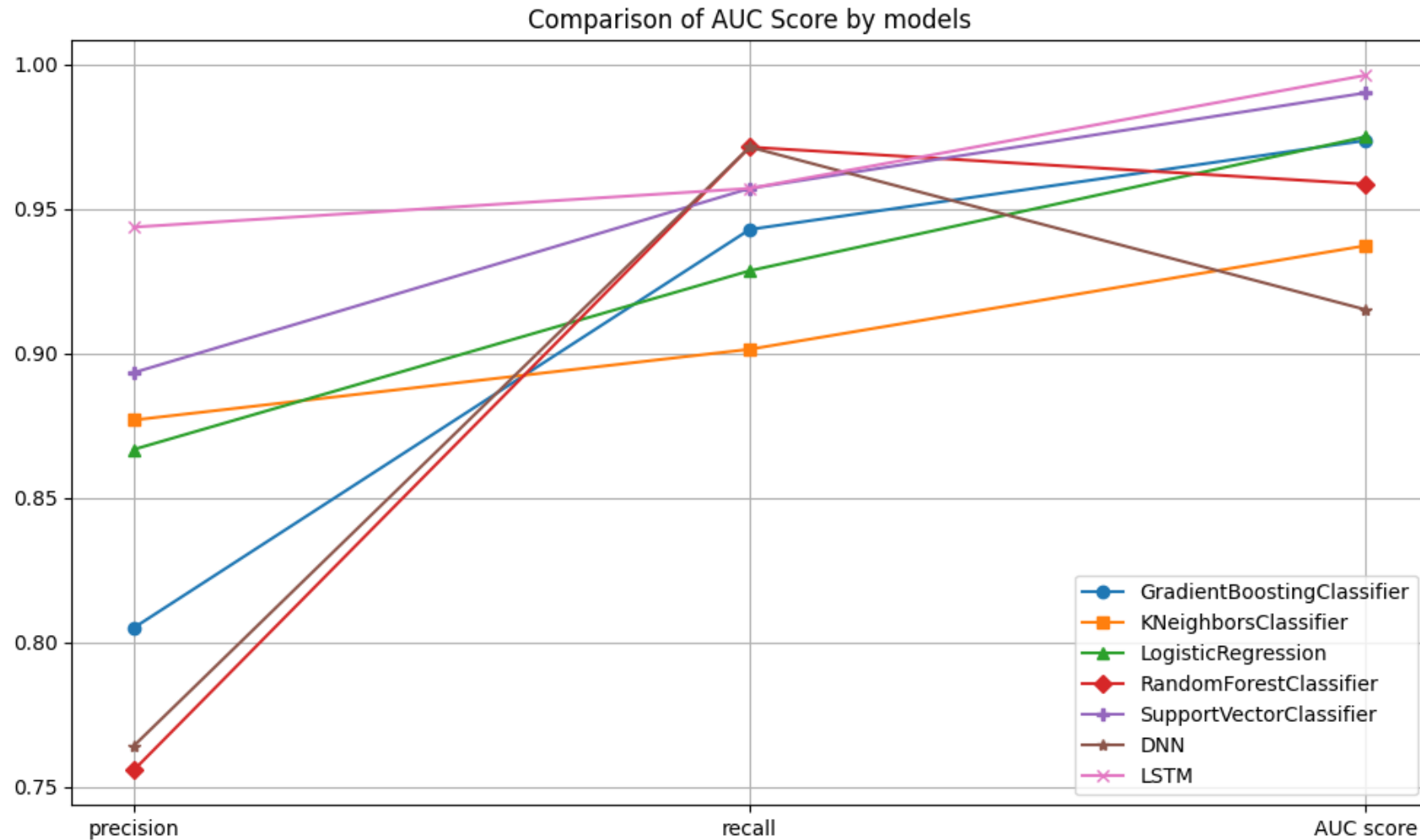
Odds Ratio for Single Jump rope



Odds Ratio for Double Jumprope



Ranking Score of Single Jumprope



Ranking Score of Double Jumprope

