

Table S1 The Performances of Different Features in 19

Features	Sn(%)	Sp(%)	Acc(%)	F1	MCC
Binary Encoding	53.94	72.29	63.12	0.5939	0.2669
AA Composition	62.42	59.28	60.85	0.6146	0.2172
Grouping AA Composition	69.36	68.53	68.95	0.6908	0.3790
Physicochemical Properties	73.11	70.42	71.77	0.7214	0.4355
KNN Features	72.52	62.34	67.43	0.6901	0.3505
Secondary Tendency Structure	67.54	73.89	70.72	0.6976	0.4152
PSSM	68.78	75.88	72.33	0.7131	0.4478
BPB	70.39	75.00	72.70	0.7205	0.4544
Bi-gram	72.75	73.30	73.03	0.7295	0.4606
Tri-gram	74.86	74.76	74.81	0.7482	0.4962
Proposed Algorithm	78.65	76.78	77.72	0.7792	0.5544

Table S2 The Performances of Different Methods in 19

<i>Method</i>	<i>Sn(%)</i>	<i>Sp(%)</i>	<i>Acc(%)</i>	<i>F1</i>	<i>MCC</i>
DNABIND ⁶⁵	67.36	67.46	67.41	0.6740	0.3482
DNAbinder ⁶⁵	67.47	70.28	68.88	0.6843	0.3777
DBD-Threader ⁶⁶	55.37	91.20	73.29	0.6746	0.4989
DNA-Prot ⁶⁶	65.39	77.20	71.30	0.6950	0.4290
iDNA-Prot ⁶⁷	74.29	72.01	73.15	0.7345	0.4632
DBPPred ⁶⁸	76.95	71.31	74.13	0.7484	0.4834
PLMLA ⁶⁹	63.38	66.20	64.79	0.6429	0.2960
Phosida ⁷⁰	76.19	81.40	78.80	0.7823	0.5767
LysAcet ⁷¹	75.08	71.63	73.36	0.7381	0.4674
EnsemblePail ⁷²	74.89	68.73	71.81	0.7265	0.4371
PSKAcePred ⁷³	68.78	66.36	67.57	0.6796	0.3516
BRABSB ⁷⁴	78.67	68.77	73.72	0.7496	0.4768
SSPKA ⁷⁵	73.39	76.06	74.73	0.7438	0.4947
Proposed Algorithm	78.65	76.78	77.72	0.7792	0.5544

Table S3 The Performances of Different Features in 23

Features	Sn(%)	Sp(%)	Acc(%)	F1	MCC
Binary Encoding	56.36	75.80	66.08	0.6243	0.3279
AA Composition	64.84	62.79	63.82	0.6418	0.2764
Grouping AA Composition	71.78	72.04	71.91	0.7187	0.4382
Physicochemical Properties	75.53	73.93	74.73	0.7493	0.4947

KNN Features	74.94	65.85	70.40	0.7168	0.4096
Secondary Tendency Structure	69.96	77.40	73.68	0.7266	0.4749
PSSM	71.20	79.39	75.30	0.7424	0.5076
BPB	72.81	78.51	75.66	0.7495	0.5140
Bi-gram	75.17	76.81	75.99	0.7579	0.5199
Tri-gram	77.28	78.27	77.78	0.7766	0.5555
Proposed Algorithm	81.07	80.29	80.68	0.8076	0.6136

Table S4 The Performances of Different Methods in 23

<i>Method</i>	<i>Sn(%)</i>	<i>Sp(%)</i>	<i>Acc(%)</i>	<i>F1</i>	<i>MCC</i>
DNABIND ⁶⁵	69.78	70.97	70.38	0.7020	0.4075
DNAbinder ⁶⁵	69.89	73.79	71.84	0.7128	0.4371
DBD-Threader ⁶⁶	57.79	94.71	76.25	0.7087	0.5649
DNA-Prot ⁶⁶	67.81	80.71	74.26	0.7249	0.4893
iDNA-Prot ⁶⁷	76.71	75.52	76.12	0.7626	0.5223
DBPPred ⁶⁸	79.37	74.82	77.10	0.7760	0.5425
PLMLA ⁶⁹	65.80	69.71	67.76	0.6711	0.3554
Phosida ⁷⁰	78.61	84.91	81.76	0.8117	0.6365
LysAcet ⁷¹	77.50	75.14	76.32	0.7660	0.5265
EnsemblePail ⁷²	77.31	72.24	74.78	0.7540	0.4961
PSKAcePred ⁷³	71.20	69.87	70.54	0.7073	0.4107
BRABSB ⁷⁴	81.09	72.28	76.65	0.7762	0.5349
SSPKA ⁷⁵	75.81	79.57	77.69	0.7726	0.5542
Proposed Algorithm	81.07	80.29	80.68	0.8076	0.6136

Table S5 The Performances of Different Features in 25

Features	Sn(%)	Sp(%)	Acc(%)	F1	MCC
Binary Encoding	56.16	74.09	65.13	0.6169	0.3075
AA Composition	64.64	61.08	62.86	0.6351	0.2574
Grouping AA Composition	71.58	70.33	70.96	0.7114	0.4192
Physicochemical Properties	75.33	72.22	73.78	0.7418	0.4758
KNN Features	74.74	64.14	69.44	0.7098	0.3910
Secondary Tendency Structure	69.76	75.69	72.73	0.7189	0.4553
PSSM	71.00	77.68	74.34	0.7345	0.4879
BPB	72.61	76.80	74.71	0.7416	0.4946
Bi-gram	74.97	75.10	75.04	0.7502	0.5007
Tri-gram	77.08	76.56	76.82	0.7688	0.5364
Proposed Algorithm	80.87	78.58	79.73	0.7996	0.5947

Table S6 The Performances of Different Methods in 25

<i>Method</i>	<i>Sn(%)</i>	<i>Sp(%)</i>	<i>Acc(%)</i>	<i>F1</i>	<i>MCC</i>
DNABIND ⁶⁵	69.58	69.26	69.42	0.6947	0.3884
DNAbinder ⁶⁵	69.69	72.08	70.89	0.7053	0.4178
DBD-Threader ⁶⁶	57.59	93.00	75.30	0.6998	0.5410
DNA-Prot ⁶⁶	67.61	79.00	73.31	0.7169	0.4692
iDNA-Prot ⁶⁷	76.51	73.81	75.16	0.7549	0.5034
DBPPred ⁶⁸	79.17	73.11	76.14	0.7684	0.5238
PLMLA ⁶⁹	65.60	68.00	66.80	0.6640	0.3361
Phosida ⁷⁰	78.41	83.20	80.81	0.8034	0.6168
LysAcet ⁷¹	77.30	73.43	75.37	0.7583	0.5077
EnsemblePail ⁷²	77.11	70.53	73.82	0.7465	0.4775
PSKAcePred ⁷³	71.00	68.16	69.58	0.7001	0.3918
BRABSB ⁷⁴	80.89	70.57	75.73	0.7692	0.5174
SSPKA ⁷⁵	75.61	77.86	76.74	0.7647	0.5349
Proposed Algorithm	80.87	78.58	79.73	0.7996	0.5947

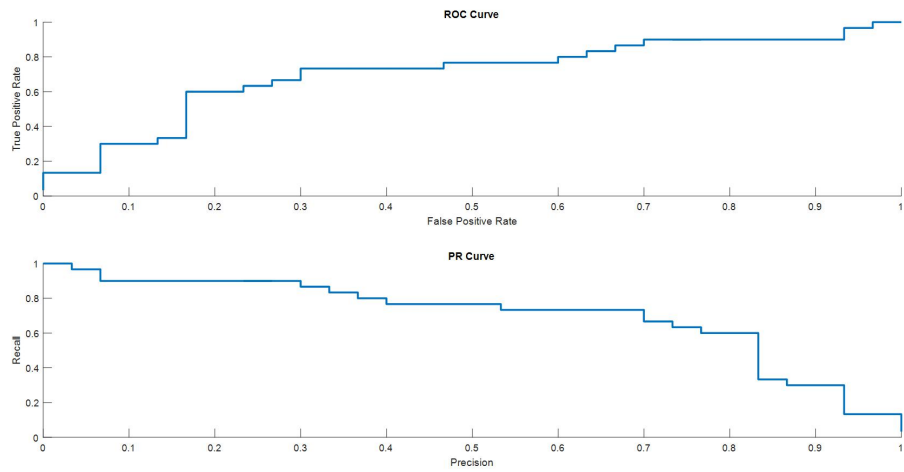


Figure S1 The ROC and Recall Curves of Length=3

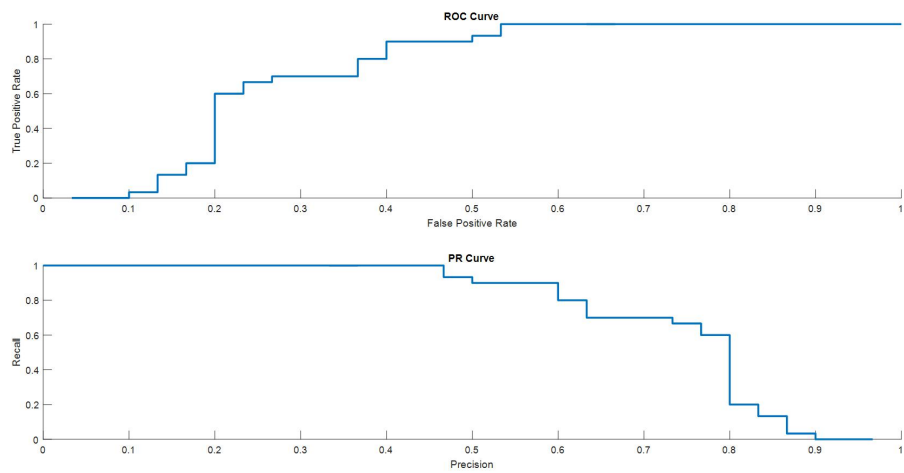


Figure S2 The ROC and Recall Curves of Length=5

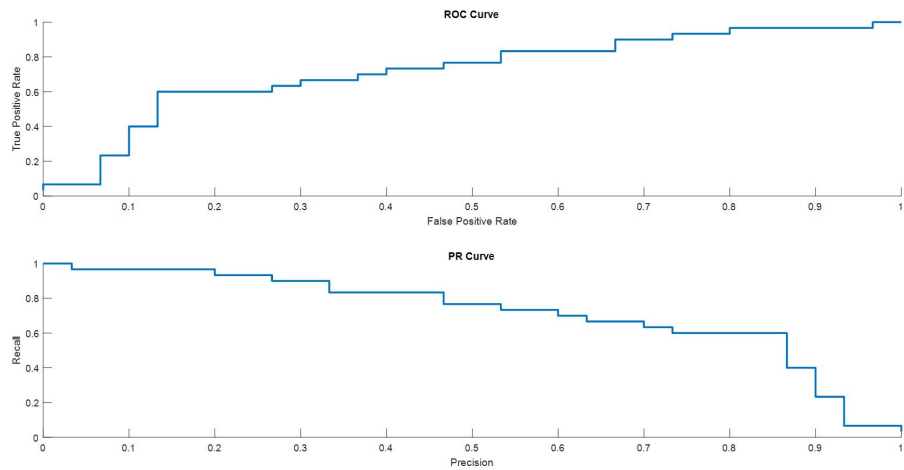


Figure S3 The ROC and Recall Curves of Length=7

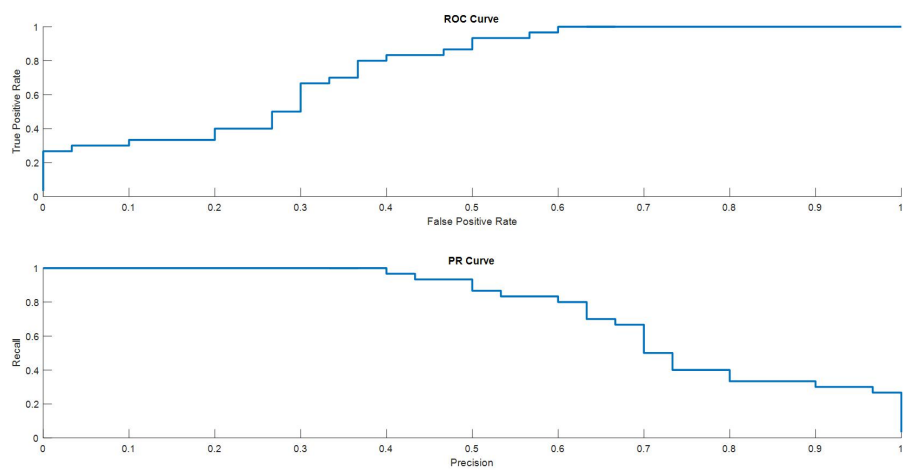


Figure S4 The ROC and Recall Curves of Length=9

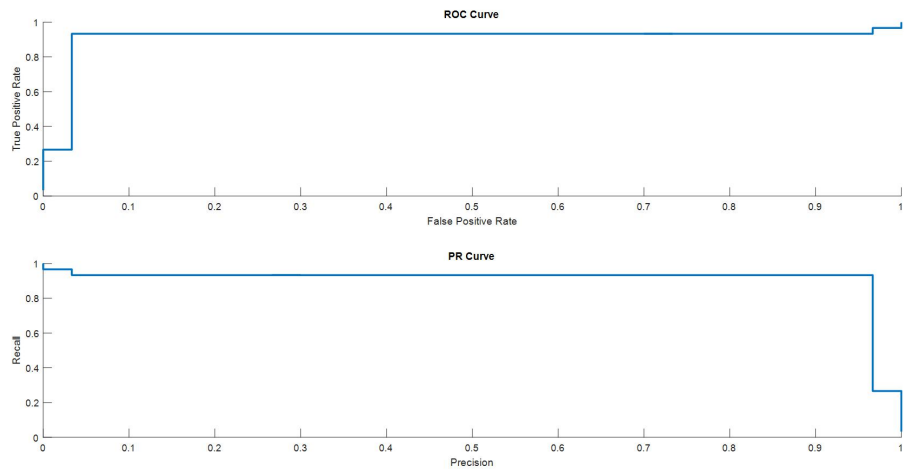


Figure S5 The ROC and Recall Curves of Length=11

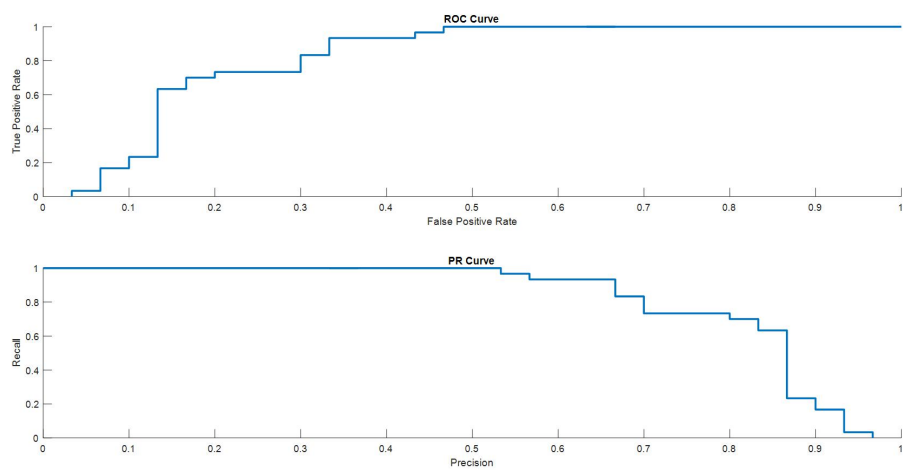


Figure S6 The ROC and Recall Curves of Length=13

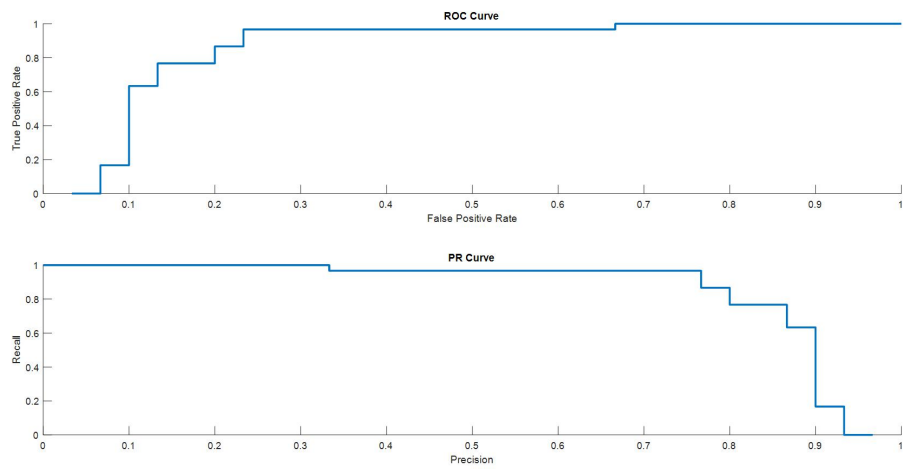
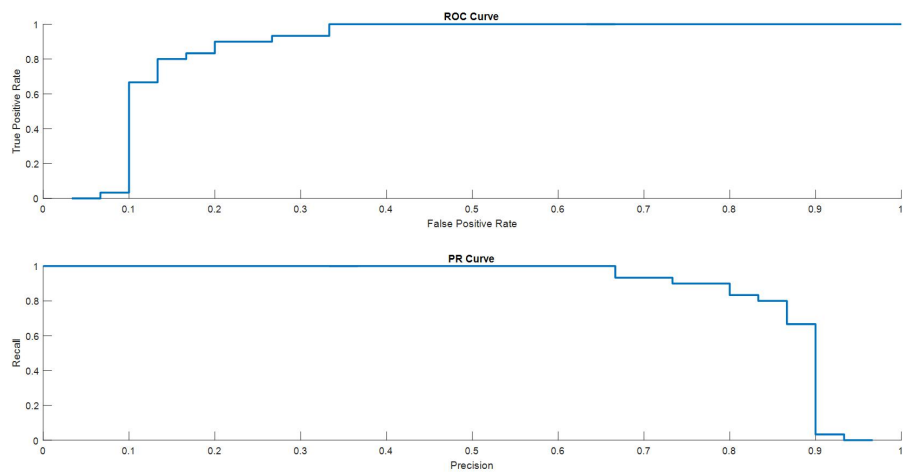


Figure S7 The ROC and Recall Curves of Length=15



**Figure S8 The ROC and Recall Curves of
Length=17**

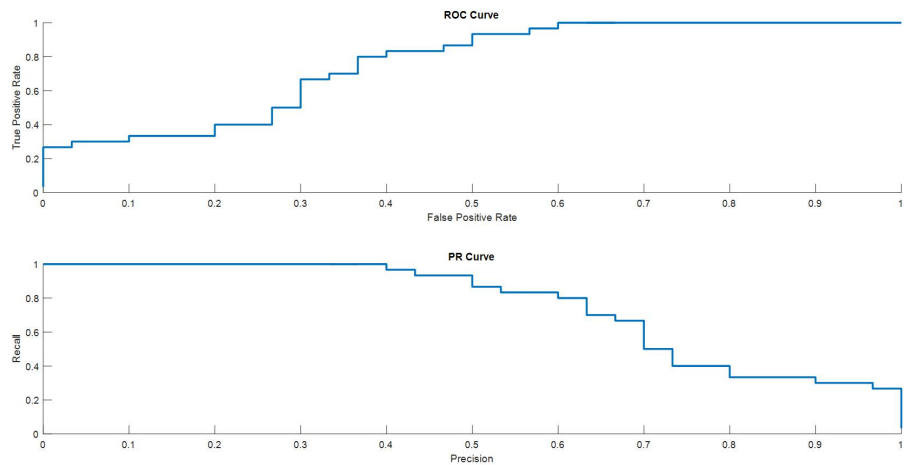


Figure S9 The ROC and Recall Curves of Length=19

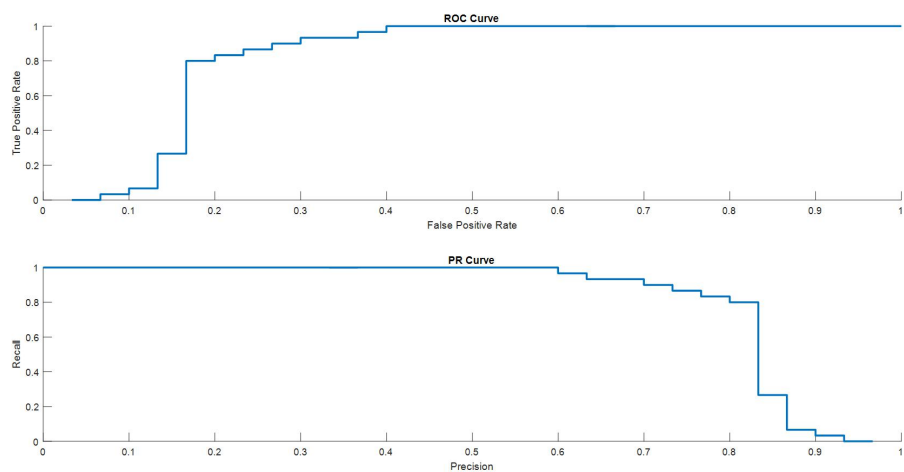


Figure S10 The ROC and Recall Curves of Length=21

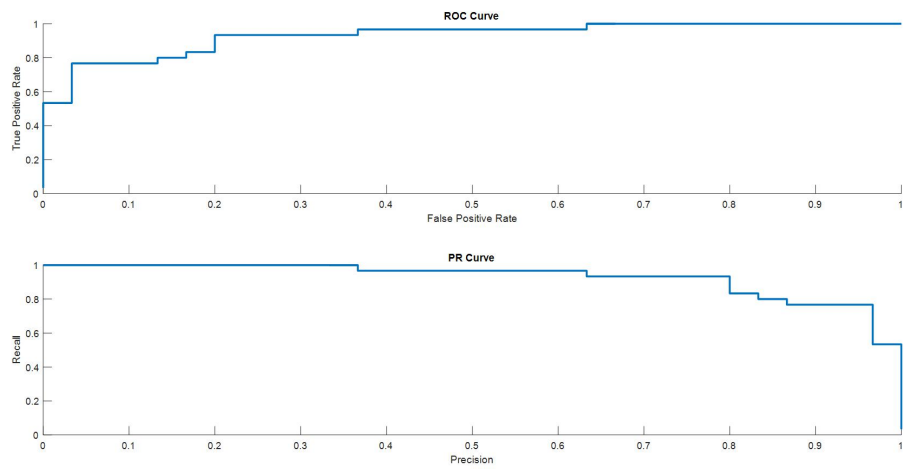


Figure S11 The ROC and Recall Curves of Length=23

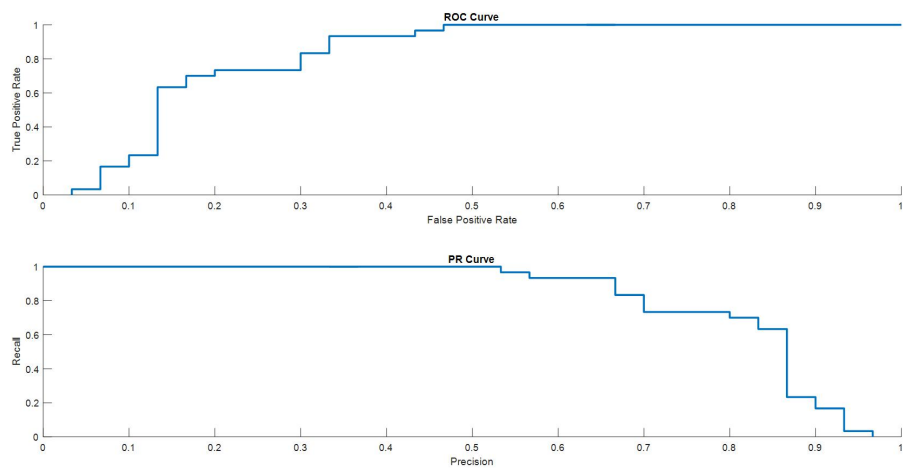


Figure S12 The ROC and Recall Curves of Length=25

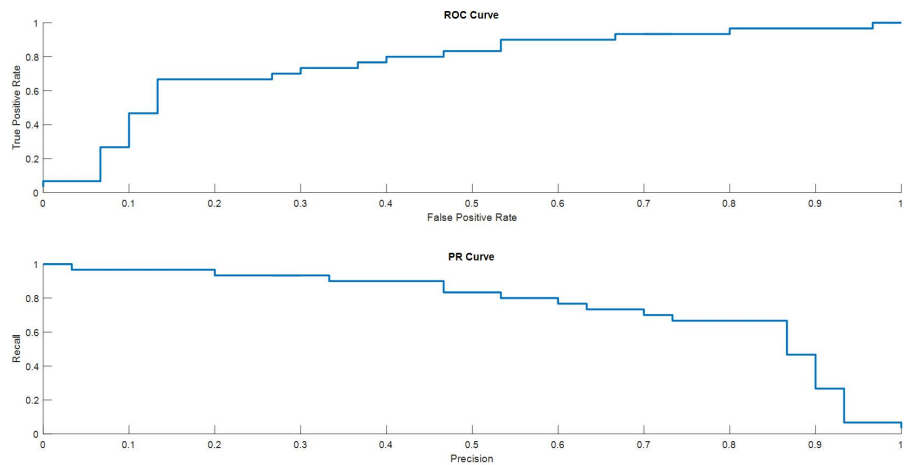


Figure S13 The ROC and Recall Curves of Length=27

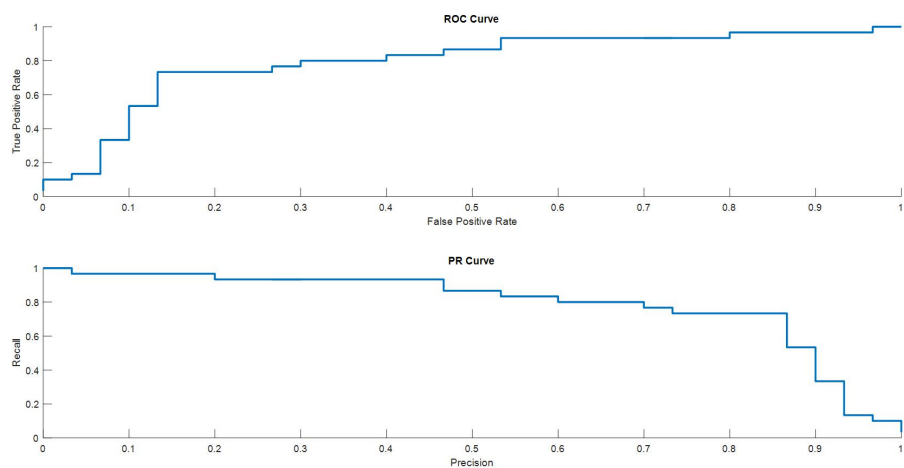


Figure S14 The ROC and Recall Curves of Length=29