

Supplementary Information

Supplementary Table S1. Independent test identifying enhancers and their strength under 5 trials. Supplementary Table S2. Performance comparison of dual-scale fusion using different combinations of filters on the benchmark dataset.

Table S1 Independent test identifying enhancers and their strength under 5 trials.

Layer	No. of Trials	ACC(%)	MCC	SN(%)	SP(%)	AUC(%)
First layer	1	83.00	0.661	80.00	86.00	86.38
	2	82.25	0.647	78.50	86.00	86.15
	3	81.75	0.636	79.50	84.00	86.19
	4	82.50	0.652	78.50	86.50	86.09
	5	81.50	0.631	79.00	84.00	85.85
	Mean	82.20	0.645	79.10	85.30	86.13
	Var	0.285	0.0001	0.340	1.160	0.029
Second layer	1	92.00	0.848	99.00	85.00	97.56
	2	90.00	0.810	98.00	82.00	96.43
	3	89.50	0.805	99.00	80.00	96.17
	4	91.50	0.839	99.00	84.00	97.47
	5	89.50	0.802	98.00	81.00	96.24
	Mean	90.50	0.821	98.60	82.40	96.77
	Var	1.100	0.0004	0.240	3.440	0.374

Table S2 Performance comparison of dual-scale fusion using different combinations of filters on the benchmark dataset.

Dataset	Combine	ACC(%)	MCC	SN(%)	SP(%)	AUC(%)
Cross-validation	First layer					
	(8, 10)	78.64	0.573	73.91	82.93	84.75
	(8, 12)	79.01	0.578	75.43	81.88	84.78
	(10, 12)	78.94	0.580	72.84	84.23	84.97
	Second layer					
	(8, 10)	66.91	0.336	70.96	62.35	68.94
	(8, 12)	66.98	0.338	71.95	61.37	68.83
	(10, 12)	66.91	0.344	72.58	61.00	68.72
	Independent test	First layer				
(8, 10)		80.75	0.616	77.50	84.00	84.63
(8, 12)		82.25	0.646	80.00	84.50	85.33
(10, 12)		82.50	0.651	79.50	85.50	85.58
Second layer						
(8, 10)		88.00	0.776	98.00	78.00	93.63
(8, 12)		90.50	0.817	97.00	84.00	95.12
(10, 12)		91.50	0.837	98.00	85.00	96.60

Note: (n_1, n_2) denotes using a filter size of n_1 and n_2 to perform dual-scale fusion.