

1. Table of model hyperparameters descriptions

Model	Hidden chanel	Num epochs	Patience	lr	Weight decay	dropout
No pretrain	64	300	30	0.01	5e-4	0.5
GCN-AE	64	200	-	0.001	-	-
Pretrain	64	300	-	0.001	5e-4	-
Finetune	64	300	30	0.001	5e-3	0.5

2. Top 100 predicted BRCA driver gene candidates

Rank	gene
1	SUN5
2	TTN
3	PCBP4
4	SUN3
5	DVL1
6	LRP5
7	PIK3R3
8	PIK3R2
9	DVL2
10	SYNE3
11	DVL3
12	SRC
13	LRP6
14	MUC16
15	GSK3B
16	HDAC1
17	DIRAS1
18	MAPK1
19	PRKACA
20	PRKACB
21	PRKACG
22	MAPK3
23	RBPJ
24	MAPK8
25	TRIM55
26	WNT5A
27	FZD1
28	WNT3A
29	GRB2
30	MUC12
31	MUC6
32	MAPK9
33	PTPRB
34	FZD4
35	MUC20
36	FZD6

37	FZD5
38	FN1
39	MUC17
40	TP53I3
41	ITGB1
42	CALM3
43	MAML2
44	RNF43
45	FZD2
46	FZD8
47	MUC13
48	PDGFRB
49	BCL2
50	TEK
51	CDK1
52	FZD7
53	EGF
54	DKK1
55	CD44
56	DNAH1
57	KDR
58	PRKCB
59	FZD9
60	SFRP1
61	WNT4
62	RAC2
63	JUN
64	WNT1
65	FZD3
66	MUC5B
67	ZNRF3
68	DLL1
69	PLCG2
70	PRKCA
71	WNT2
72	TLE3
73	PLCG1
74	NOTCH4
75	RAC3
76	PTK2
77	WNT11
78	TLE1
79	IMPG2
80	CDK2
81	WIF1
82	MUC7

83	STAT3
84	MAP4K3
85	CTBP1
86	WNT7A
87	MUC21
88	ANK1
89	SHC1
90	MUC5AC
91	VANGL2
92	TCF7L2
93	H3C12
94	CALML3
95	SOS1
96	CDKN1A
97	MAML1
98	WNT5B
99	SLITRK2