

Table S1. Details of four datasets (Dataset-4, Dataset-5, Dataset-6 and TotalCircRD-2).

Datasets	Number of circRNAs	Number of diseases	Number of associations	Matrix density
Dataset-4	310	40	331	0.026
Dataset-5	237	56	265	0.019
Dataset-6	459	68	516	0.016
TotalCircRD-2	683	89	789	0.012

Table S2. The number of associations validated by our model for the top 10, 30, 50 and 100 on eight datasets (Dataset-1, Dataset-2, Dataset-3, TotalCircRD-1, Dataset-4, Dataset-5, Dataset-6 and TotalCircRD-2).

	Top 10	Top 30	Top 50	Top 100
Dataset-1	7	26	46	64
Dataset-2	10	30	39	53
Dataset-3	10	30	50	84
TotalCircRD-1	10	30	46	84
Dataset-4	10	30	49	96
Dataset-5	10	30	50	79
Dataset-6	10	30	50	67
TotalCircRD-2	10	30	50	100

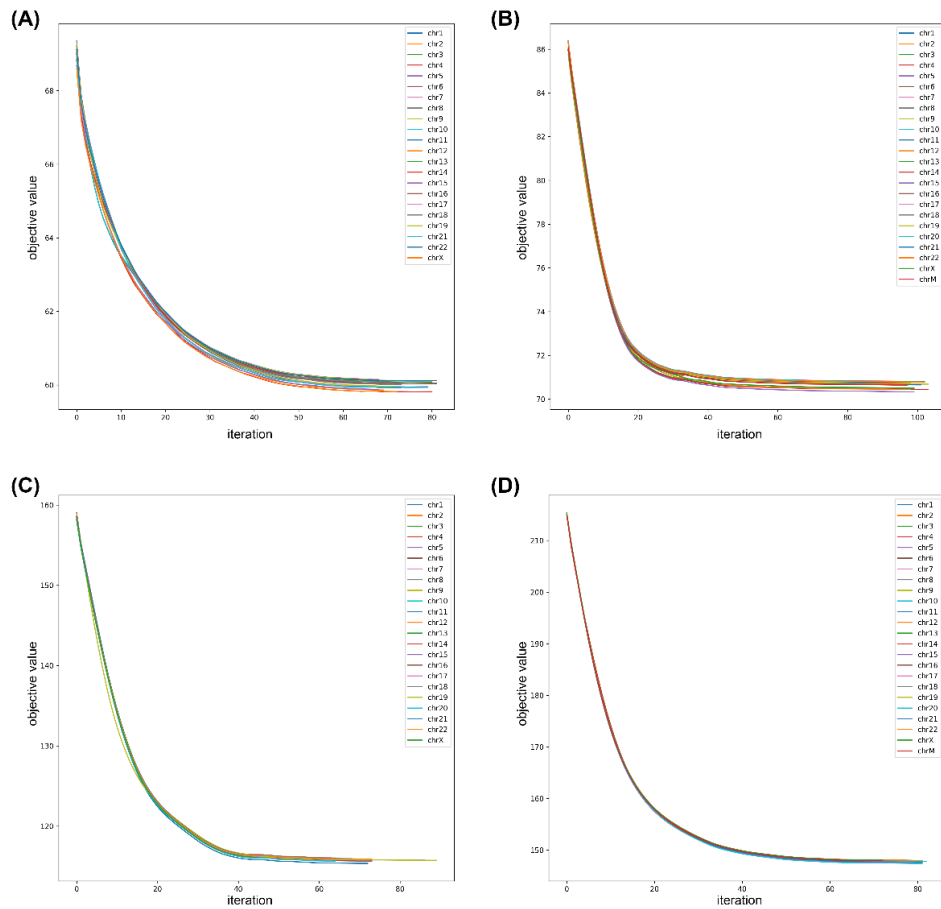


Figure S1. Objective function values versus iteration number in Dataset-1 (A), Dataset-2 (B), Dataset-3 (C) and TotalCircRD-1 (D).

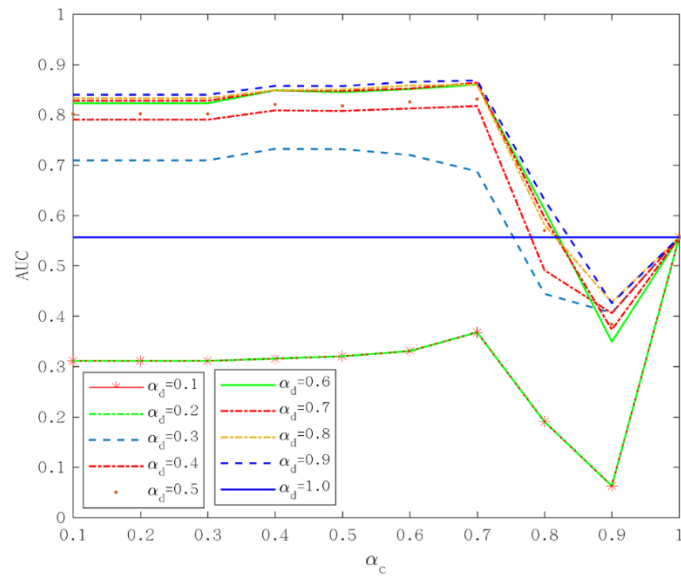


Figure S2. Adjust parameters α_c and α_d to determine the impact on Dataset-1.

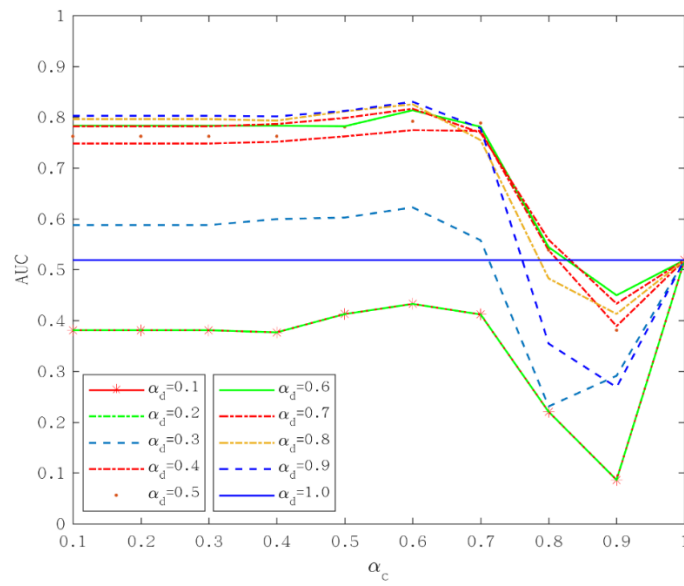


Figure S3. Adjust parameters α_c and α_d to determine the impact on Dataset-2.

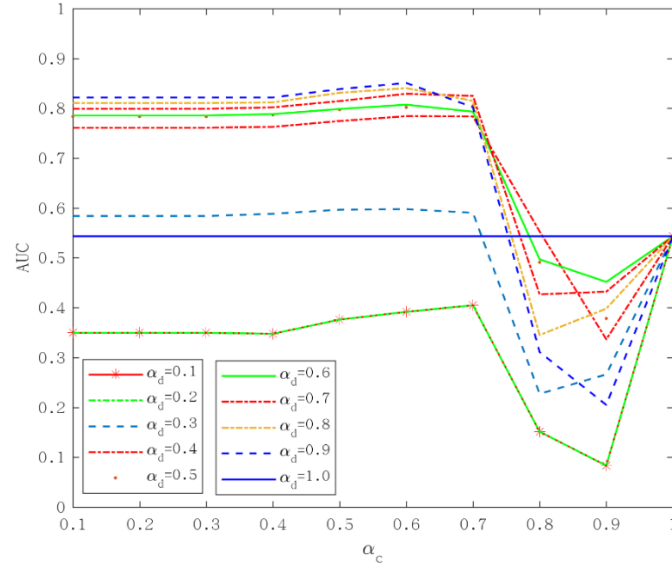


Figure S4. Adjust parameters α_c and α_d to determine the impact on Dataset-3.

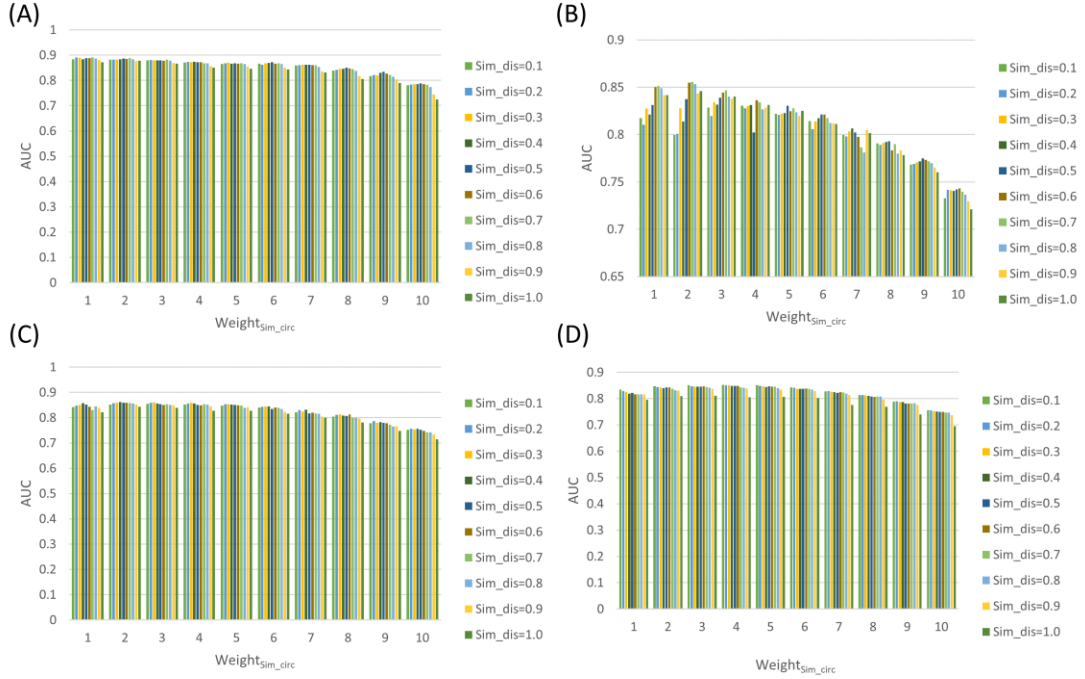


Figure S5. Different weight to similarity in four datasets (Dataset-1 (A), Dataset-2 (B), Dataset-3 (C), TotalCircRD-1 (D)).

$Weight_{Sim_circ}$ represents the weight of $Sim_{lev}(circ_i, circ_j)$ which equals 1 minus the weight of $Gkl(circ_i, circ_j)$, Sim_dis represents the weight of $Sim_{Wang}(d_i, d_j)$ which equals 1 minus the weight of $Gkl(d_i, d_j)$.

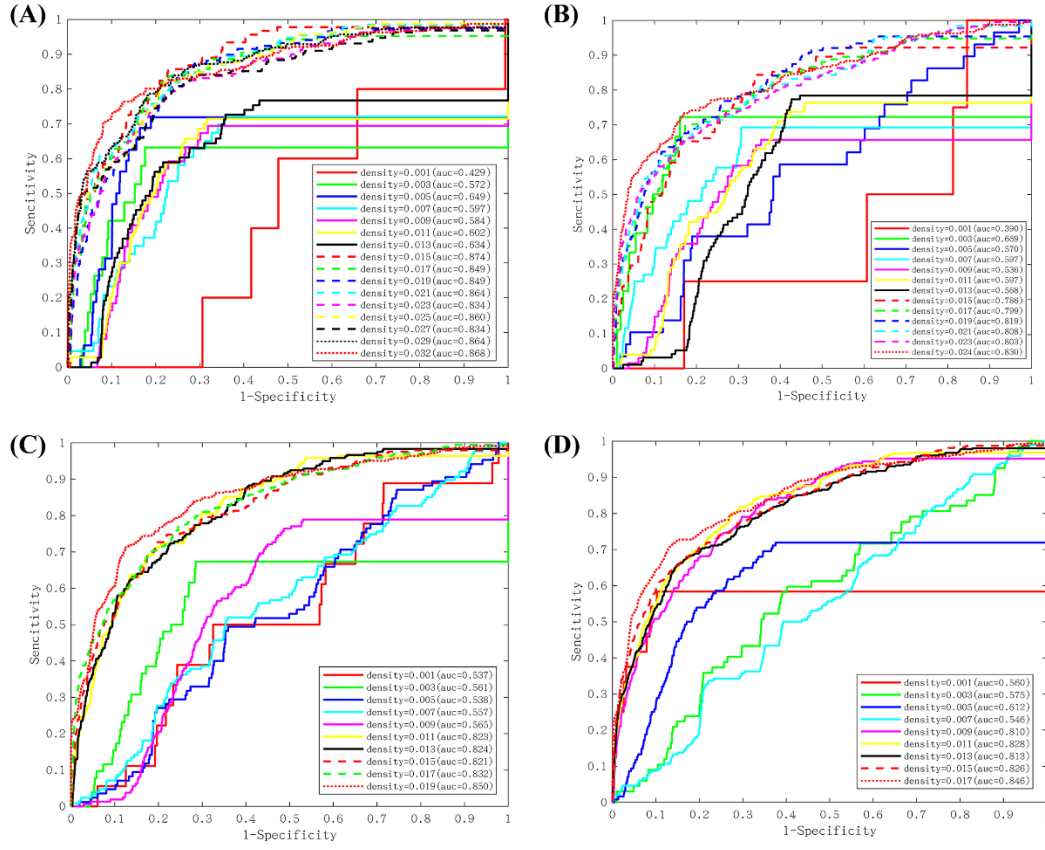


Figure S6. The effect of different sparsity on the results on the four datasets. (A) Dataset-1 dataset, (B) Dataset-2 dataset, (C) Dataset-3 dataset and (D) TotalCircRD-1 dataset.

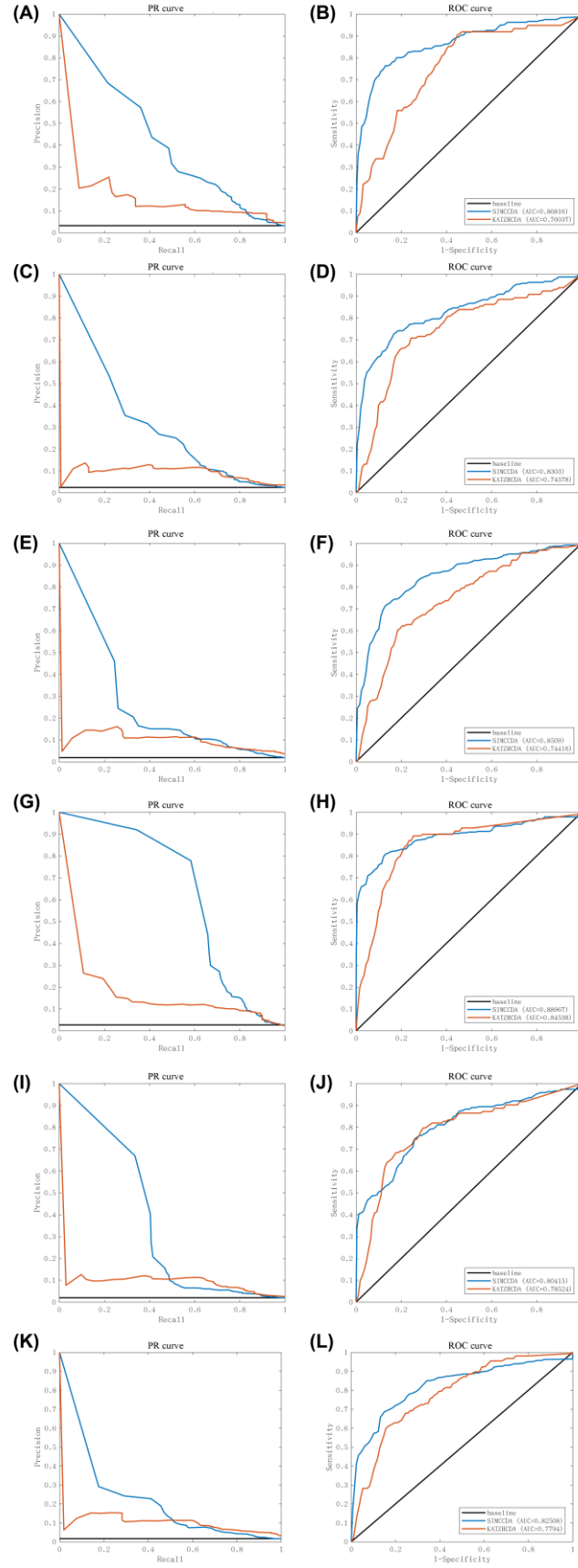


Figure S7. Comparison of SIMCCDA with KATZHCDA on the Dataset-1 (A, B), Dataset-2 (C, D), Dataset-3 (E, F), Dataset-4 (G, H), Dataset-5 (I, J) and Dataset-6 (K, L) using LOOCV-based PR curve and ROC curve.

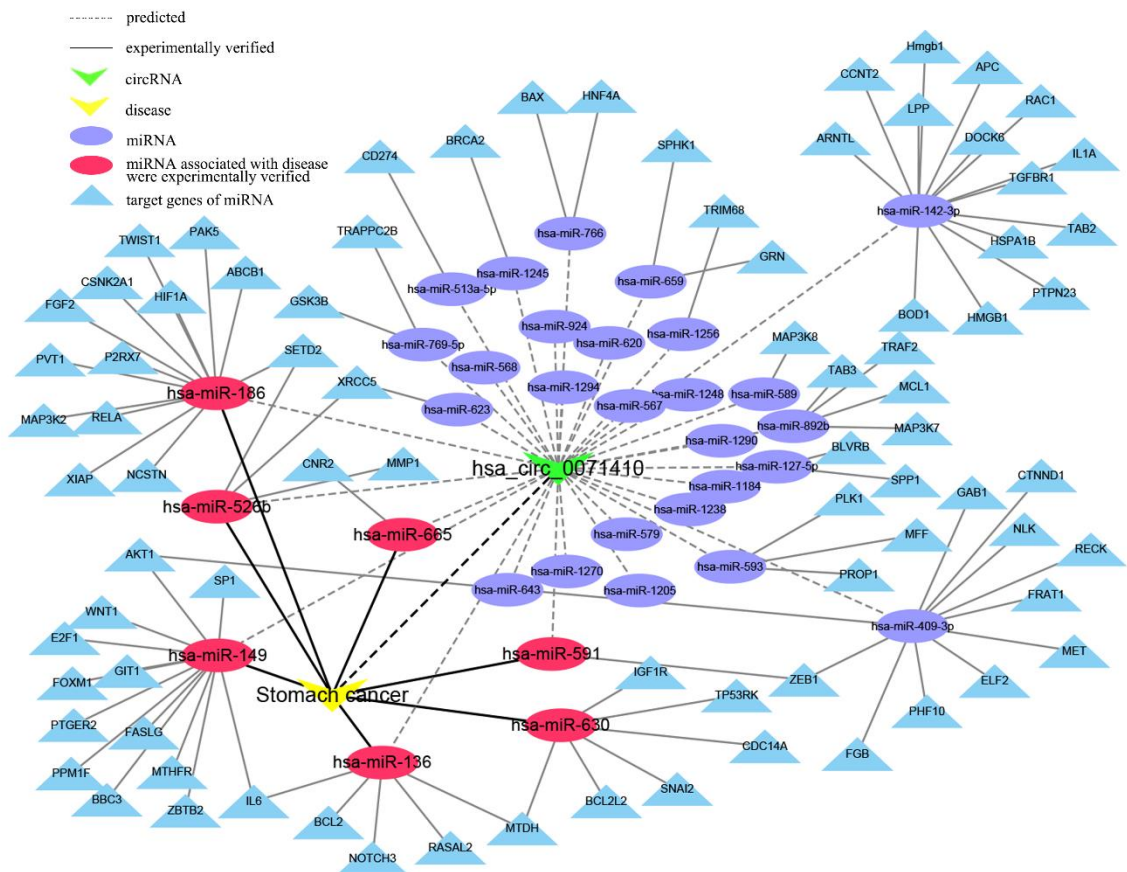


Figure S10. hsa_circ_0071410-miRNA-mRNA regulatory network in stomach cancer.s

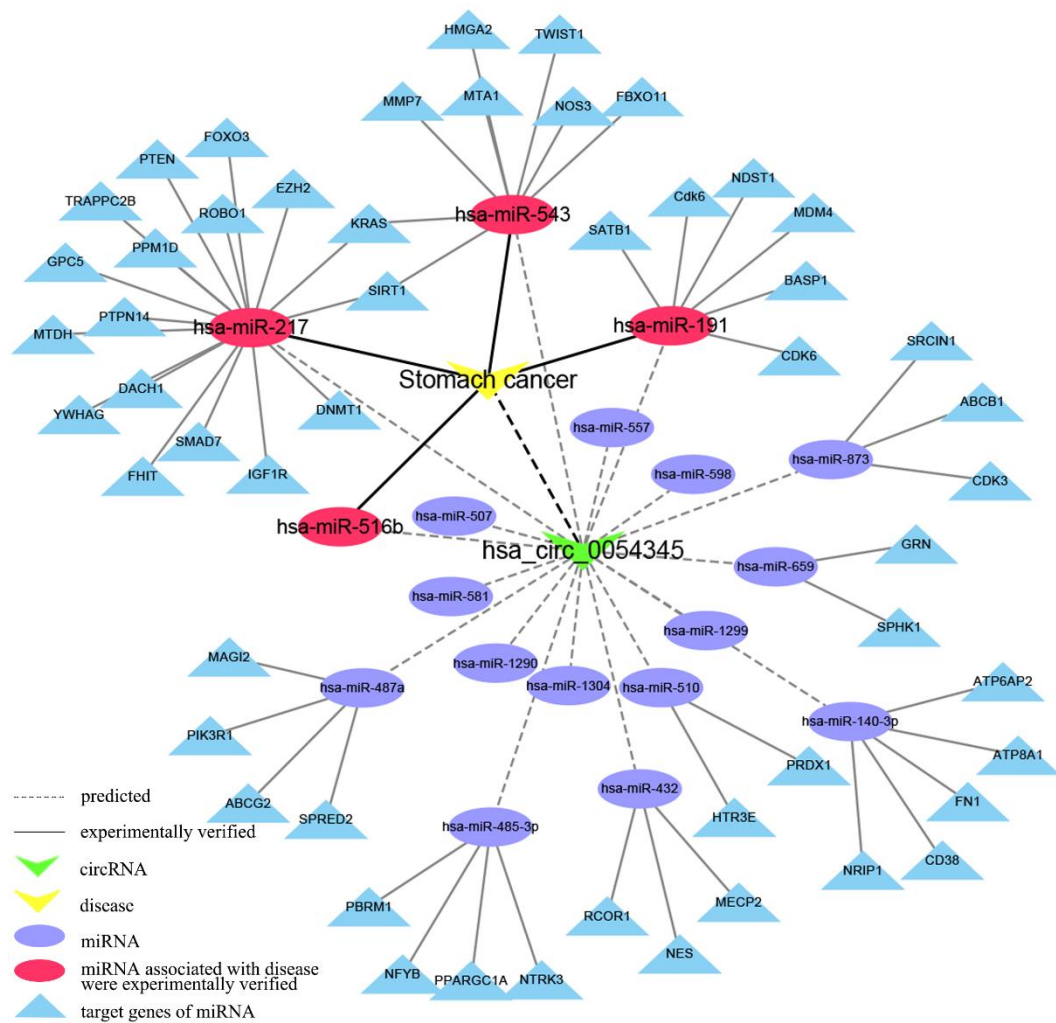


Figure S11. hsa_circ_0054345-miRNA-mRNA regulatory network in stomach cancer.