



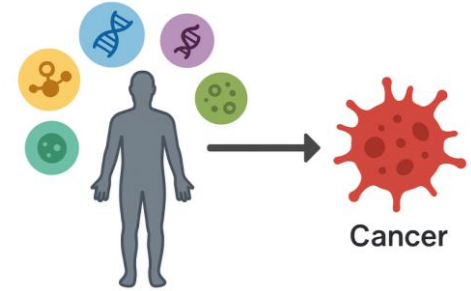
Missing-Modality-Aware Graph Neural Network for Cancer Classification

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Motivation and Problem Statement

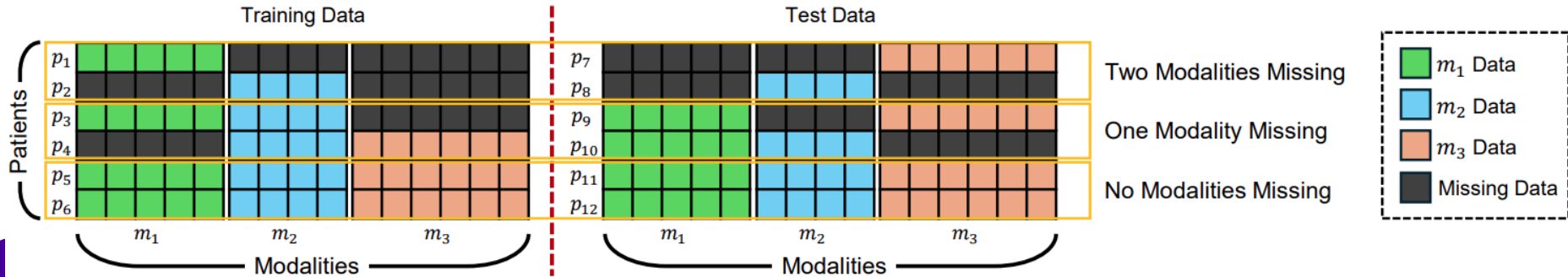
➤ Why multiomics integration?

- ❑ **Cancer:** Complex interactions across molecular layers
- ❑ **Multiomics integration:** Deeper insights into cancer biology



➤ Missing modality problem:

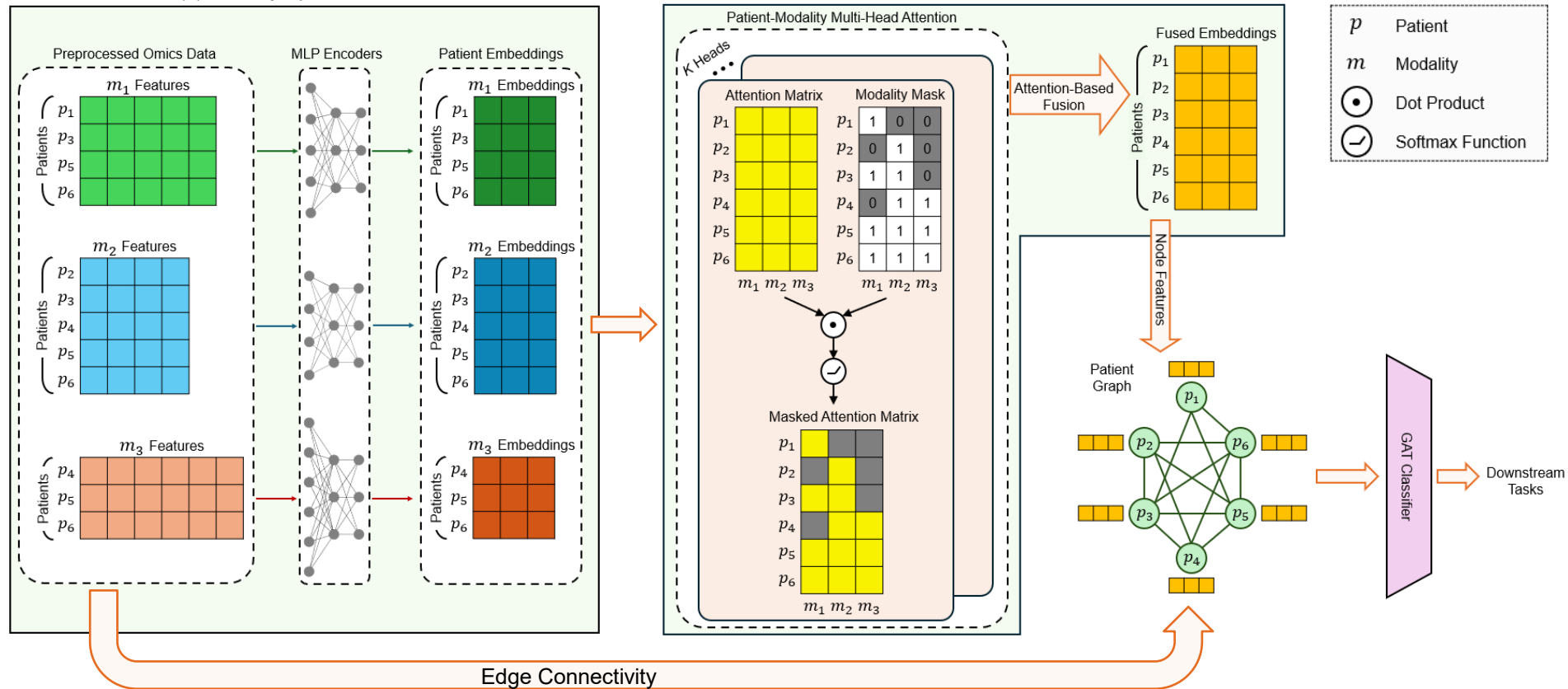
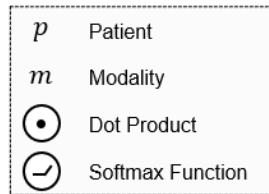
- ❑ All data from some modalities are missing for some patients.



Proposed architecture (MAGNET)

(1) Modality-Specific Encoder

(2) Patient-Modality Multi-Head Attention Integration



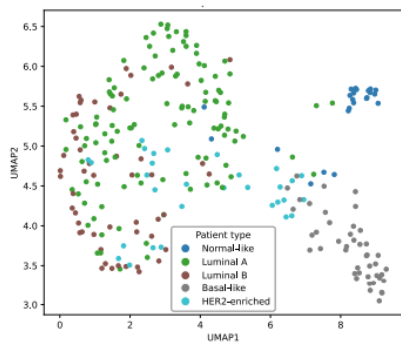
Performance of Cancer Classification

➤ Performance of Cancer Classification

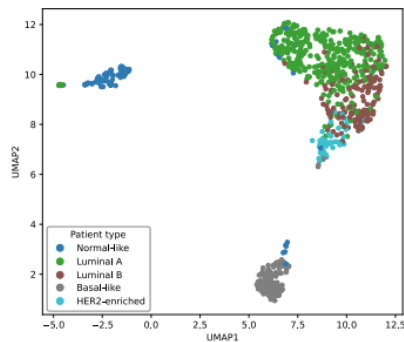
Dataset	Metric	MOGONET-Zero [10]	MOGONET- k NN [10]	MRGCN [47]	M3Care [15]	MUSE [16]	MAGNET
BRCA	Accuracy (↑)	0.795±0.025	0.847±0.015	0.844±0.009	0.899±0.016	0.895±0.021	0.918±0.012
	Macro F1 (↑)	0.638±0.062	0.794±0.035	0.826±0.014	0.872±0.018	0.880±0.014	0.902±0.019
	Weighted F1 (↑)	0.758±0.036	0.838±0.018	0.842±0.008	0.898±0.015	0.894±0.022	0.917±0.011
	MCC (↑)	0.706±0.035	0.781±0.022	0.778±0.012	0.858±0.022	0.851±0.031	0.884±0.016
BLCA	Accuracy (↑)	0.952±0.005	0.952±0.005	0.955±0.000	0.968±0.011	0.966±0.014	0.970±0.006
	AUPRC (↑)	0.652±0.106	0.688±0.098	0.617±0.086	0.686±0.114	0.653±0.085	0.724±0.101
	AUROC (↑)	0.898±0.142	0.902±0.162	0.944±0.033	0.949±0.051	0.939±0.046	0.956±0.025
	MCC (↑)	-0.005±0.009	-0.005±0.009	0.000±0.000	0.597±0.164	0.509±0.294	0.642±0.072
OV	Accuracy (↑)	0.581±0.027	0.573±0.051	0.597±0.014	0.597±0.031	0.608±0.036	0.614±0.052
	AUPRC (↑)	0.630±0.030	0.594±0.044	0.646±0.022	0.607±0.051	0.628±0.078	0.646±0.046
	AUROC (↑)	0.621±0.037	0.603±0.062	0.655±0.025	0.630±0.040	0.652±0.067	0.652±0.056
	MCC (↑)	0.199±0.071	0.126±0.138	0.201±0.029	0.199±0.060	0.225±0.073	0.228±0.104

Representation analysis: BRCA

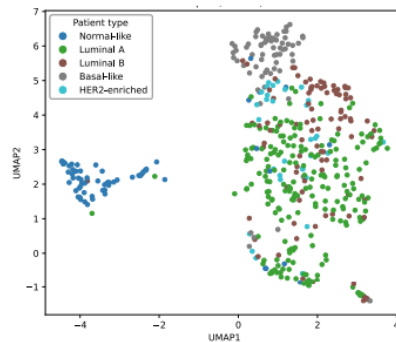
Training data



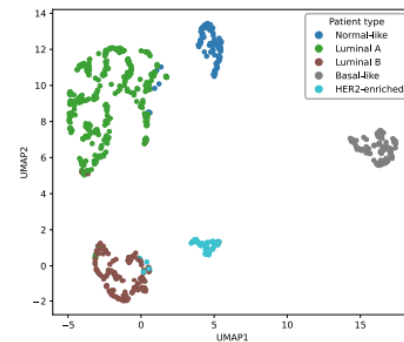
DNA



mRNA

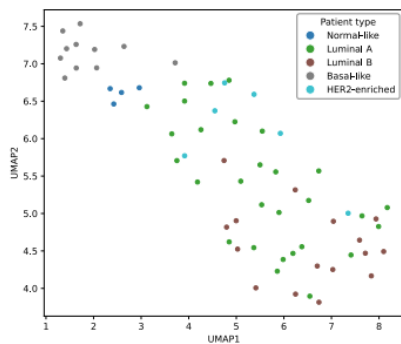


miRNA

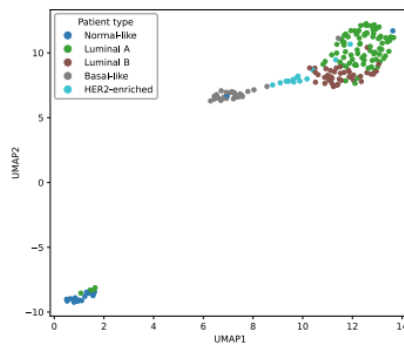


MAGNET (ours)

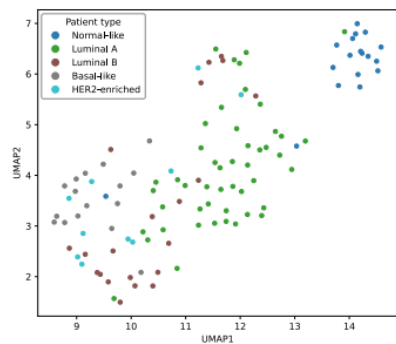
Test data



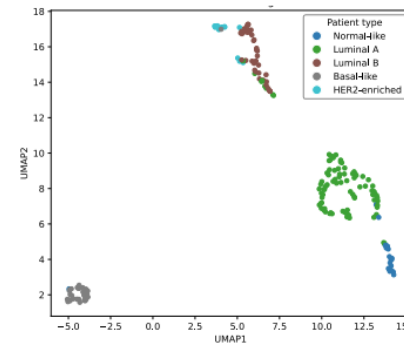
DNA



mRNA



miRNA



MAGNET (ours)