

Microbiome Profile Type	Dataset	Size of Original Dimension	AutoEncoder	Encoder Used	Encoder Structure	Size of Latent Dimension	Classifier	AUC
Strain-level marker profile	Cirrhosis	120,553	SAE	DeepMicro's Encoder	256	256	SVM	0.928
				Our Encoder	128	128	SVM	0.955
				None	-	-	SVM	0.967
			DAE	DeepMicro's Encoder	512-256-128	128	SVM	0.903
				Our Encoder	512-256-128	128	SVM	0.948
				None	-	-	SVM	0.967
			VAE	DeepMicro's Encoder	256-8	8	SVM	0.891
				Our Encoder	512-4	4	SVM	0.911
				None	-	-	SVM	0.967
			CAE	DeepMicro's Encoder	16-8	3,872	SVM	0.940
				Our Encoder	16-8-4	1,444	SVM	0.959
				None	-	-	SVM	0.967
	Colorectal	108,034	SAE	DeepMicro's Encoder	32	32	MLP	0.799
				Our Encoder	128	128	RF	0.848
				None	-	-	RF	0.893
			DAE	DeepMicro's Encoder	512-256-128	128	MLP	0.803
				Our Encoder	256-128	128	MLP	0.843
				None	-	-	RF	0.877
			VAE	DeepMicro's Encoder	256-8	8	RF	0.737
				Our Encoder	512-4	4	MLP	0.800
				None	-	-	RF	0.868
			CAE	DeepMicro's Encoder	4-2-1	441	MLP	0.789
				Our Encoder	16-8	10,368	RF	0.871
				None	-	-	RF	0.877
	IBD	91,756	SAE	DeepMicro's Encoder	64	64	SVM	0.955
				Our Encoder	64	64	MLP	0.918
				None	-	-	MLP	0.953
			DAE	DeepMicro's Encoder	512-256-128	128	RF	0.911
				Our Encoder	256-128	128	MLP	0.918
				None	-	-	MLP	0.965
			VAE	DeepMicro's Encoder	128-4	4	MLP	0.899
				Our Encoder	512-4	4	MLP	0.900
				None	-	-	MLP	0.947
			CAE	DeepMicro's Encoder	8-4	1,936	RF	0.929
				Our Encoder	16-8	2,888	MLP	0.871
				None	-	-	MLP	0.959
	Obesity	99,568	SAE	DeepMicro's Encoder	512	512	MLP	0.658
				Our Encoder	64	64	MLP	0.645
				None	-	-	MLP	0.645
			DAE	DeepMicro's Encoder	256-128	128	RF	0.659
				Our Encoder	256-128-64	64	MLP	0.723
				None	-	-	MLP	0.721
			VAE	DeepMicro's Encoder	512-8	8	RF	0.599
				Our Encoder	512-16	16	SVM	0.521
				None	-	-	MLP	0.683
			CAE	DeepMicro's Encoder	64-32	16,928	RF	0.622
				Our Encoder	32-16-8	2,888	MLP	0.671
				None	-	-	MLP	0.689
			SAE	DeepMicro's Encoder	512	512	SVM	0.762
				Our Encoder	512	512	RF	0.713
				None	-	-	MLP	0.745

	C-T2D	119,792	DAE	DeepMicro's Encoder	256-128	128	RF	0.702
				Our Encoder	512-256	256	MLP	0.750
				None	-	-	RF	0.746
			VAE	DeepMicro's Encoder	128-16	16	SVM	0.719
				Our Encoder	512-4	4	MLP	0.707
				None	-	-	RF	0.744
			CAE	DeepMicro's Encoder	4-2	968	MLP	0.763
				Our Encoder	16-8-4	1,444	RF	0.733
				None	-	-	RF	0.750
	EW-T2D	83,456	SAE	DeepMicro's Encoder	256	256	RF	0.899
				Our Encoder	128	128	MLP	0.929
				None	-	-	MLP	0.919
			DAE	DeepMicro's Encoder	256-128-64	64	RF	0.840
				Our Encoder	512-256-128	128	MLP	0.894
				None	-	-	MLP	0.914
			VAE	DeepMicro's Encoder	256-16	16	SVM	0.853
				Our Encoder	512-4	4	MLP	0.877
				None	-	-	MLP	0.924
			CAE	DeepMicro's Encoder	8-4	1,764	SVM	0.796
				Our Encoder	16-8	10,368	MLP	0.864
				None	-	-	MLP	0.904
	Cirrhosis	443	SAE	DeepMicro's Encoder	32	32	SVM	0.801
				Our Encoder	256	256	SVM	0.866
				None	-	-	RF	0.954
			DAE	DeepMicro's Encoder	1024-512	512	MLP	0.806
				Our Encoder	512-256	512	RF	0.846
				None	-	-	RF	0.953
			VAE	DeepMicro's Encoder	512-8	8	SVM	0.781
				Our Encoder	64-4	4	RF	0.767
				None	-	-	RF	0.952
			CAE	DeepMicro's Encoder	16-8-4	1,461	RF	0.888
				Our Encoder	16-8-4	1,461	RF	0.949
				None	-	-	RF	0.953
	Colorectal	381	SAE	DeepMicro's Encoder	256	256	SVM	0.712
				Our Encoder	512	512	MLP	0.800
				None	-	-	RF	0.900
			DAE	DeepMicro's Encoder	256-128	128	SVM	0.728
				Our Encoder	512-256	256	MLP	0.729
				None	-	-	RF	0.885
			VAE	DeepMicro's Encoder	512-8	8	SVM	0.739
				Our Encoder	512-4	4	MLP	0.720
				None	-	-	RF	0.888
			CAE	DeepMicro's Encoder	8-4	2,116	RF	0.809
				Our Encoder	8-4-2	772	RF	0.889
				None	-	-	RF	0.891
	IBD	572	SAE	DeepMicro's Encoder	512	512	MLP	0.817
				Our Encoder	128	128	SVM	0.834
				None	-	-	RF	0.906
			DAE	DeepMicro's Encoder	512-256	256	MLP	0.779
				Our Encoder	512-256	256	MLP	0.776
				None	-	-	RF	0.905
			VAE	DeepMicro's Encoder	32-8	8	RF	0.779
				Our Encoder	256-4	4	MLP	0.788

Species-level relative abundance profile				None	-	-	RF	0.893		
			CAE	DeepMicro's Encoder	32-16-8	3,872	RF	0.873		
				Our Encoder	16-8-4	1,764	RF	0.900		
				None	-	-	RF	0.900		
	Obesity	465	SAE	DeepMicro's Encoder	128	128	MLP	0.645		
				Our Encoder	512	512	MLP	0.664		
				None	-	-	MLP	0.690		
			DAE	DeepMicro's Encoder	1024-512	512	MLP	0.631		
				Our Encoder	512-256	256	MLP	0.675		
				None	-	-	MLP	0.673		
			VAE	DeepMicro's Encoder	256-4	4	MLP	0.600		
				Our Encoder	256-4	4	MLP	0.617		
				None	-	-	MLP	0.677		
			CAE	DeepMicro's Encoder	4-2	968	RF	0.674		
				Our Encoder	32-16-8	2,888	MLP	0.677		
				None	-	-	MLP	0.701		
			C-T2D	542	SAE	DeepMicro's Encoder	64	64	SVM	0.715
						Our Encoder	256	256	SVM	0.722
						None	-	-	RF	0.763
					DAE	DeepMicro's Encoder	128-64	64	SVM	0.711
						Our Encoder	512-256	256	MLP	0.727
						None	-	-	RF	0.759
					VAE	DeepMicro's Encoder	512-16	16	SVM	0.715
						Our Encoder	32-4	4	SVM	0.630
	None	-				-	RF	0.757		
	CAE	DeepMicro's Encoder			4-2-1	576	RF	0.725		
		Our Encoder			8-4	1,936	MLP	0.764		
		None			-	-	RF	0.761		
	EW-T2D	503	SAE	DeepMicro's Encoder	256	256	SVM	0.640		
				Our Encoder	128	128	MLP	0.768		
				None	-	-	MLP	0.753		
			DAE	DeepMicro's Encoder	1024-512	512	SVM	0.612		
				Our Encoder	512-256	256	MLP	0.732		
				None	-	-	MLP	0.717		
			VAE	DeepMicro's Encoder	64-8	8	RF	0.640		
				Our Encoder	512-4	4	MLP	0.778		
				None	-	-	MLP	0.712		
			CAE	DeepMicro's Encoder	16-8	3,200	RF	0.829		
				Our Encoder	32-16	7,056	MLP	0.788		
				None	-	-	MLP	0.747		