1 Additional datasets.

Table 1: Results on additional datasets. The bold text denotes the best performance, while the underlined text indicates the second-best performance. 'N/A' indicates that the model has limitations preventing it from running on the dataset.

Datasets	numerical	categorical	objects	classes	shot	logreg	knn	TabPFN	FeatLLM	ProtoLLM
arrhythmia	206	73	452	13	1	72.16±9.09	52.48±0.00	N/A	N/A	**72.49±5.24**
					2	77.70±3.11	67.01±2.19	N/A	N/A	**78.11±4.33**
ecoli	7	0	336	8	1	91.68±5.41	70.13±0.00	86.65±7.32	58.87±0.00	**93.22±3.45**
					2	92.94±4.76	89.92±6.30	92.00±4.80	N/A	**95.93±2.79**
lymph	3	15	148	4	1	**86.13±5.74**	81.36±3.99	84.61±7.29	85.71±8.53	85.98±7.73
					2	87.64±8.05	83.74±7.79	83.08±10.21	87.31±7.33	**90.78±6.09**
balance-scale	4	0	625	3	1	61.32±11.74	57.22±9.56	63.05±11.10	66.63±8.43	**72.19±9.55**
					2	66.87±10.51	63.85±7.37	**78.01±6.46**	66.03±2.98	75.80±6.23
					4	75.24±8.31	69.97±3.97	**87.37±4.94**	78.64±10.76	78.13±5.27
cmc	2	7	1473	3	1	52.48±6.77	52.13±4.18	54.13±5.52	53.88±5.28	**54.39±5.67**
					2	54.14±5.47	52.04±4.32	53.84±5.50	**56.37±5.84**	54.72±4.29
					4	57.04±4.36	56.48±3.35	**58.42±2.89**	57.14±3.39	57.72±4.22
credit-g	7	13	1000	2	1	51.34±7.43	50.39±4.00	52.12±6.94	55.40±5.89	**61.35±3.29**
					2	53.62±4.20	53.33±3.87	54.48±4.79	55.94±1.10	**62.25±2.86**
					4	56.45±5.59	54.26±4.91	57.66±4.79	57.42±3.10	**63.26±2.87**
diabetes	8	0	768	2	1	57.72±15.43	56.24±9.01	56.95±14.11	**80.08±1.31**	75.55±3.33
					2	59.88±13.49	59.48±6.89	64.76±10.85	**80.28±0.75**	75.68±3.61
					4	68.54±9.24	63.70±8.14	70.68±7.86	**79.38±1.66**	75.76±3.78
glass	9	0	214	6	1	70.90±5.99	67.61±3.52	**77.71±5.33**	N/A	74.43±4.82
					2	75.33±5.12	71.42±5.06	**79.91±3.40**	N/A	76.43±4.64
					4	79.99±4.13	75.18±4.17	**86.12±2.89**	N/A	78.51±3.96
haberman	2	1	306	2	1	53.67±12.02	52.47±8.47	55.39±7.66	64.08±3.79	**66.58±6.24**
					2	55.57±9.11	53.80±5.59	56.45±7.48	65.77±5.25	**66.70±6.10**
					4	59.57±11.21	57.74±8.48	58.02±9.69	66.22±5.00	**66.58±5.88**
heart-c	6	7	303	2	1	67.64±12.45	59.58±10.02	70.22±12.77	79.60±5.49	**82.12±4.63**
					2	73.24±16.29	69.34±10.84	80.43±9.50	83.03±4.91	**85.18±3.82**
					4	79.14±10.40	73.87±11.46	81.67±9.57	83.28±4.87	**86.39±4.92**
mushroom	0	22	8124	2	1	80.94±16.42	71.60±12.41	69.07±13.30	89.56±16.20	**94.12±2.92**
					2	82.49±14.45	78.78±10.94	77.77±12.80	**96.01±3.79**	94.60±3.77
					4	91.74±5.91	84.83±5.61	88.39±6.49	**96.17±2.12**	96.03±2.57
page-blocks	10	0	5473	5	1	**84.41±5.07**	72.20±10.10	81.44±6.30	81.08±9.35	83.25±7.56
					2	85.32±4.54	77.71±6.30	84.81±6.95	84.64±6.84	**87.45±4.58**
					4	91.04±3.65	84.56±3.79	**92.72±3.22**	88.14±10.53	89.76±2.72
soybean	0	35	683	19	1	94.31±1.84	82.02±2.62	N/A	N/A	**94.44±1.84**
					2	96.29±2.12	90.96±1.64	N/A	N/A	**97.20±1.04**
					4	98.25±0.49	96.18±1.02	N/A	N/A	**98.31±0.43**
tae	3	2	151	3	1	51.52±8.33	49.14±7.57	52.17±9.03	**57.91±6.90**	53.90±8.76
					2	53.14±8.22	52.67±8.52	57.37±10.44	**61.75±7.81**	54.12±10.60
					4	53.32±6.37	52.54±5.24	**60.45±6.91**	60.21±8.43	55.44±8.22
tic-tac-toe	0	9	958	2	1	55.21±5.27	53.65±4.69	48.99±5.30	**87.10±6.69**	53.75±7.09
					2	55.76±7.58	52.82±5.92	52.00±5.08	**75.37±4.64**	57.35±8.10
					4	57.67±9.26	54.78±8.04	56.49±5.75	**81.11±15.13**	60.90±8.81
vehicle	18	0	846	4	1	**58.68±6.84**	55.94±4.45	58.20±6.15	53.50±6.22	56.91±5.81
					2	63.66±7.67	61.92±4.33	**68.45±6.12**	61.01±5.07	59.51±5.37
					4	72.39±7.58	66.59±3.81	**78.25±4.76**	60.09±1.77	61.55±5.00
average rank					1	2.85	4.69	3.31	2.54	**1.62**
					2	3.17	4.58	3.17	2.17	**1.92**
					4	3.50	5.00	2.40	2.10	**2.00**

2 Comparison with TabLLM

Template.

Answer choices:{answer choices}

{task for a class}. Given a list of {feature name}({feature description}): {feature value list}. Which feature name should this belong to?

Answer:

Figure 1: Prompt template.

Example.

Answer choices:Own-child|||Husband|||Not-in-family|||Unmarried|||Wife|||Other-relative.

The person earns more than 50000 dollars per year. Given a list of relationship (what this individual is relative to others):Own-child, Husband, Not-in-family, Unmarried, Wife and Other-relative. Which relationship should this belong to?

Answer:

Figure 2: Example prompt for querying feature values of 'relationship' for the class yes (indicating the person earns more than 50,000 dollars per year) in the Adult dataset.

Table 2: Results on TabLLM and ProtoLLM with T0 as the Backbone.

Data	Shot	TabLLM	ProtoLLM(T0)
Adult	4	**83.57**	64.4
	8	**83.52**	79.98
	16	83.23	**83.38**
	32	82.6	**84.54**
	64	84.88	**85.3**
Bank	4	**62.51**	58.98
	8	63.19	**64.31**
	16	63.73	**71.23**
	32	66.51	**74.8**
	64	70.83	**78.89**
Blood	4	55.87	**59.61**
	8	**66.01**	64.12
	16	65.14	**70.2**
	32	69.95	**71.53**
	64	70.88	**74.82**
Car	4	**85.82**	74.64
	8	**87.43**	75.97
	16	**88.65**	78.22
	32	**89.02**	81.56
	64	**92.18**	85.35
Credit-g	4	51.9	**52.88**
	8	**56.42**	55.6
	16	60.38	**60.83**
	32	**68.64**	59.49
	64	**70.8**	64.69
Diabetes	4	70.42	**72.13**
	8	64.3	**71.94**
	16	67.34	**76.23**
	32	69.74	**80.14**
	64	71.56	**79.09**
Heart	4	59.74	**73.99**
	8	70.14	**82.4**
	16	81.72	**88.1**
	32	87.43	**89.14**
	64	89.78	**89.81**
Average Rank	4	1.57	1.43
	8	1.43	1.57
	16	1.86	1.14
	32	1.71	1.29
	64	1.71	1.29