

Partial Annotation Learning for Biomedical Entity Recognition: Experimental Results

This document provides our full experimental results.

Table S1. Main Results averaged over all random seeds

Dataset	Scheme	Rate	Model	P	R	F1
CellLine	RAR	0.1	BiLSTM-Partial-CRF	64.22±1.18	63.97±1.70	64.08±1.12
CellLine	RAR	0.1	EER-PubMedBERT	51.55±1.44	82.09±0.51	63.32±1.17
CellLine	RAR	0.1	PubMedBERT	71.06±1.23	67.39±1.85	69.15±0.84
CellLine	RAR	0.1	TS-PubMedBERT-Partial-CRF	49.31±11.00	80.56±3.64	60.13±8.21
CellLine	RAR	0.2	BiLSTM-Partial-CRF	63.15±1.52	61.65±1.82	62.36±0.87
CellLine	RAR	0.2	EER-PubMedBERT	48.92±3.01	81.43±0.72	61.06±2.24
CellLine	RAR	0.2	PubMedBERT	68.45±2.75	65.45±2.83	66.79±0.30
CellLine	RAR	0.2	TS-PubMedBERT-Partial-CRF	43.65±6.05	81.29±1.30	56.50±4.93
CellLine	RAR	0.3	BiLSTM-Partial-CRF	62.78±1.43	62.39±1.79	62.54±0.59
CellLine	RAR	0.3	EER-PubMedBERT	51.51±2.67	81.01±0.88	62.92±1.81
CellLine	RAR	0.3	PubMedBERT	66.73±2.11	61.24±2.94	63.79±1.39
CellLine	RAR	0.3	TS-PubMedBERT-Partial-CRF	55.03±3.35	80.02±1.15	65.12±2.10
CellLine	RAR	0.4	BiLSTM-Partial-CRF	61.13±1.39	62.24±1.75	61.66±0.96
CellLine	RAR	0.4	EER-PubMedBERT	51.59±1.59	80.48±0.78	62.86±1.20
CellLine	RAR	0.4	PubMedBERT	62.10±4.53	51.84±4.23	56.33±3.09
CellLine	RAR	0.4	TS-PubMedBERT-Partial-CRF	49.36±7.13	79.78±1.61	60.58±5.24
CellLine	RAR	0.5	BiLSTM-Partial-CRF	63.88±2.59	57.77±3.60	60.51±1.07
CellLine	RAR	0.5	EER-PubMedBERT	53.32±2.62	78.39±2.41	63.38±1.19
CellLine	RAR	0.5	PubMedBERT	63.95±6.72	41.88±2.81	50.36±2.51
CellLine	RAR	0.5	TS-PubMedBERT-Partial-CRF	46.87±4.71	77.12±3.79	58.01±2.53
CellLine	RAR	0.6	BiLSTM-Partial-CRF	61.34±3.06	54.18±2.74	57.45±1.91
CellLine	RAR	0.6	EER-PubMedBERT	53.02±3.65	78.22±1.77	63.07±2.12
CellLine	RAR	0.6	PubMedBERT	62.71±4.08	38.07±5.34	47.26±5.17
CellLine	RAR	0.6	TS-PubMedBERT-Partial-CRF	49.54±7.72	79.57±2.43	60.56±5.13
CellLine	RAR	0.7	BiLSTM-Partial-CRF	61.45±1.90	49.02±1.07	54.53±1.23
CellLine	RAR	0.7	EER-PubMedBERT	53.66±3.49	76.50±1.89	62.96±1.82
CellLine	RAR	0.7	PubMedBERT	60.37±6.56	21.46±2.42	31.64±3.39
CellLine	RAR	0.7	TS-PubMedBERT-Partial-CRF	46.17±6.71	77.30±3.07	57.33±4.43
CellLine	RAR	0.8	BiLSTM-Partial-CRF	61.81±4.21	39.63±3.86	48.05±2.42

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Dataset	Scheme	Rate	Model	P	R	F1
CellLine	RAR	0.8	EER-PubMedBERT	53.92±1.76	75.10±2.39	62.72±0.83
CellLine	RAR	0.8	PubMedBERT	61.15±10.55	9.16±1.03	15.89±1.84
CellLine	RAR	0.8	TS-PubMedBERT-Partial-CRF	42.79±9.23	76.40±3.44	54.01±6.79
CellLine	RAR	0.9	BiLSTM-Partial-CRF	60.80±8.15	24.55±9.29	33.08±7.46
CellLine	RAR	0.9	EER-PubMedBERT	55.10±3.95	69.00±4.33	61.06±2.20
CellLine	RAR	0.9	PubMedBERT	50.00±5.39	4.02±1.57	7.38±2.80
CellLine	RAR	0.9	TS-PubMedBERT-Partial-CRF	32.82±3.21	68.87±7.73	44.28±3.86
CellLine	RSFR	0.1	BiLSTM-Partial-CRF	60.51±2.01	60.82±1.88	60.61±0.85
CellLine	RSFR	0.1	EER-PubMedBERT	51.92±5.17	79.81±1.58	62.73±3.42
CellLine	RSFR	0.1	PubMedBERT	69.21±0.55	65.59±1.05	67.35±0.78
CellLine	RSFR	0.1	TS-PubMedBERT-Partial-CRF	48.90±9.19	82.01±2.06	60.59±6.81
CellLine	RSFR	0.2	BiLSTM-Partial-CRF	60.35±3.21	58.69±1.53	59.49±2.31
CellLine	RSFR	0.2	EER-PubMedBERT	52.06±0.92	81.12±0.69	63.42±0.76
CellLine	RSFR	0.2	PubMedBERT	68.90±2.11	60.32±1.84	64.31±1.70
CellLine	RSFR	0.2	TS-PubMedBERT-Partial-CRF	46.94±5.29	83.02±0.99	59.75±4.14
CellLine	RSFR	0.3	BiLSTM-Partial-CRF	56.19±1.45	57.56±2.49	56.84±1.44
CellLine	RSFR	0.3	EER-PubMedBERT	51.22±2.16	80.76±1.87	62.62±1.14
CellLine	RSFR	0.3	PubMedBERT	64.95±2.25	57.82±2.60	61.10±1.25
CellLine	RSFR	0.3	TS-PubMedBERT-Partial-CRF	47.47±4.79	80.93±2.06	59.62±3.01
CellLine	RSFR	0.4	BiLSTM-Partial-CRF	52.16±4.41	57.24±2.21	54.38±1.68
CellLine	RSFR	0.4	EER-PubMedBERT	51.59±2.15	78.89±1.59	62.37±1.95
CellLine	RSFR	0.4	PubMedBERT	64.64±3.03	48.13±2.75	55.06±1.50
CellLine	RSFR	0.4	TS-PubMedBERT-Partial-CRF	48.25±8.80	78.68±3.93	59.06±5.43
CellLine	RSFR	0.5	BiLSTM-Partial-CRF	52.38±2.20	54.21±1.93	53.21±0.65
CellLine	RSFR	0.5	EER-PubMedBERT	53.30±2.71	79.36±2.53	63.66±1.37
CellLine	RSFR	0.5	PubMedBERT	65.92±2.01	41.80±4.65	50.93±3.09
CellLine	RSFR	0.5	TS-PubMedBERT-Partial-CRF	46.24±4.58	79.79±1.76	58.37±3.35
CellLine	RSFR	0.6	BiLSTM-Partial-CRF	50.67±4.41	45.98±2.70	47.98±1.55
CellLine	RSFR	0.6	EER-PubMedBERT	53.37±1.79	77.22±2.11	63.07±0.99
CellLine	RSFR	0.6	PubMedBERT	59.20±1.71	29.37±5.36	38.96±4.66
CellLine	RSFR	0.6	TS-PubMedBERT-Partial-CRF	44.27±3.38	74.14±3.88	55.29±2.52
CellLine	RSFR	0.7	BiLSTM-Partial-CRF	48.62±4.46	40.64±2.81	44.23±3.19
CellLine	RSFR	0.7	EER-PubMedBERT	49.20±1.51	74.09±1.69	59.11±1.32
CellLine	RSFR	0.7	PubMedBERT	57.81±2.11	21.80±3.28	31.51±3.50
CellLine	RSFR	0.7	TS-PubMedBERT-Partial-CRF	44.87±5.57	74.46±3.74	55.66±3.70
CellLine	RSFR	0.8	BiLSTM-Partial-CRF	51.66±3.37	36.91±2.68	42.91±1.67
CellLine	RSFR	0.8	EER-PubMedBERT	52.26±3.25	70.54±2.56	59.91±1.65

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Dataset	Scheme	Rate	Model	P	R	F1
CellLine	RSFR	0.8	PubMedBERT	53.19±4.13	11.52±1.82	18.82±2.52
CellLine	RSFR	0.8	TS-PubMedBERT-Partial-CRF	36.74±6.01	70.80±3.61	47.91±4.46
CellLine	RSFR	0.9	BiLSTM-Partial-CRF	53.54±3.52	24.26±3.24	33.18±3.00
CellLine	RSFR	0.9	EER-PubMedBERT	55.06±3.73	66.18±1.85	59.97±1.58
CellLine	RSFR	0.9	PubMedBERT	0.00±0.00	0.00±0.00	0.00±0.00
CellLine	RSFR	0.9	TS-PubMedBERT-Partial-CRF	37.33±7.12	67.57±0.78	47.68±5.98
Chemical	RAR	0.1	BiLSTM-Partial-CRF	80.29±0.15	85.96±0.07	83.03±0.09
Chemical	RAR	0.1	EER-PubMedBERT	83.06±0.35	91.43±0.11	87.04±0.15
Chemical	RAR	0.1	PubMedBERT	86.71±0.53	87.02±1.18	86.86±0.33
Chemical	RAR	0.1	TS-PubMedBERT-Partial-CRF	74.21±2.22	91.75±0.71	82.04±1.55
Chemical	RAR	0.2	BiLSTM-Partial-CRF	80.78±0.51	85.47±0.31	83.06±0.17
Chemical	RAR	0.2	EER-PubMedBERT	83.81±0.25	91.01±0.12	87.26±0.12
Chemical	RAR	0.2	PubMedBERT	86.71±0.47	86.20±0.76	86.45±0.53
Chemical	RAR	0.2	TS-PubMedBERT-Partial-CRF	76.79±1.75	91.02±1.41	83.28±0.86
Chemical	RAR	0.3	BiLSTM-Partial-CRF	81.21±0.45	84.57±0.18	82.85±0.17
Chemical	RAR	0.3	EER-PubMedBERT	84.05±0.28	90.61±0.22	87.20±0.11
Chemical	RAR	0.3	PubMedBERT	86.17±0.80	85.28±1.09	85.71±0.58
Chemical	RAR	0.3	TS-PubMedBERT-Partial-CRF	74.50±2.23	91.11±1.03	81.96±1.67
Chemical	RAR	0.4	BiLSTM-Partial-CRF	82.37±0.56	82.72±0.40	82.54±0.10
Chemical	RAR	0.4	EER-PubMedBERT	84.18±1.43	90.00±0.46	86.98±0.63
Chemical	RAR	0.4	PubMedBERT	87.71±0.60	80.15±4.39	83.68±2.34
Chemical	RAR	0.4	TS-PubMedBERT-Partial-CRF	76.63±1.83	91.77±0.33	83.51±1.04
Chemical	RAR	0.5	BiLSTM-Partial-CRF	84.00±0.34	79.56±0.53	81.72±0.23
Chemical	RAR	0.5	EER-PubMedBERT	85.61±0.38	88.77±0.50	87.16±0.10
Chemical	RAR	0.5	PubMedBERT	87.04±1.98	67.83±7.83	75.92±4.42
Chemical	RAR	0.5	TS-PubMedBERT-Partial-CRF	78.13±1.30	91.45±0.58	84.26±0.66
Chemical	RAR	0.6	BiLSTM-Partial-CRF	85.31±0.64	71.83±1.41	77.98±0.58
Chemical	RAR	0.6	EER-PubMedBERT	85.41±0.57	87.82±0.59	86.59±0.12
Chemical	RAR	0.6	PubMedBERT	88.26±0.73	35.79±2.15	50.89±2.18
Chemical	RAR	0.6	TS-PubMedBERT-Partial-CRF	78.87±1.27	91.31±0.35	84.62±0.72
Chemical	RAR	0.7	BiLSTM-Partial-CRF	86.15±2.61	37.35±2.89	52.04±2.96
Chemical	RAR	0.7	EER-PubMedBERT	84.37±0.59	88.08±0.29	86.18±0.21
Chemical	RAR	0.7	PubMedBERT	88.14±0.86	23.23±1.17	36.75±1.47
Chemical	RAR	0.7	TS-PubMedBERT-Partial-CRF	81.00±1.11	90.04±1.57	85.26±0.40
Chemical	RAR	0.8	BiLSTM-Partial-CRF	78.85±3.34	9.57±0.70	17.06±1.17
Chemical	RAR	0.8	EER-PubMedBERT	84.46±0.95	87.01±1.37	85.70±0.25
Chemical	RAR	0.8	PubMedBERT	87.55±0.64	12.68±1.58	22.11±2.37

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Dataset	Scheme	Rate	Model	P	R	F1
Chemical	RAR	0.8	TS-PubMedBERT-Partial-CRF	83.42±0.69	88.97±0.57	86.10±0.22
Chemical	RAR	0.9	BiLSTM-Partial-CRF	65.16±2.69	2.76±0.60	5.29±1.10
Chemical	RAR	0.9	EER-PubMedBERT	84.85±0.45	84.30±0.85	84.57±0.21
Chemical	RAR	0.9	PubMedBERT	84.96±1.72	5.25±0.37	9.89±0.67
Chemical	RAR	0.9	TS-PubMedBERT-Partial-CRF	84.21±0.85	86.07±0.89	85.12±0.55
Chemical	RSFR	0.1	BiLSTM-Partial-CRF	79.02±0.56	78.09±0.64	78.55±0.33
Chemical	RSFR	0.1	EER-PubMedBERT	82.28±0.52	86.37±0.42	84.27±0.26
Chemical	RSFR	0.1	PubMedBERT	86.58±0.23	79.26±0.44	82.76±0.31
Chemical	RSFR	0.1	TS-PubMedBERT-Partial-CRF	74.46±2.59	90.70±0.94	81.76±1.70
Chemical	RSFR	0.2	BiLSTM-Partial-CRF	77.71±0.42	70.14±0.46	73.73±0.28
Chemical	RSFR	0.2	EER-PubMedBERT	79.10±2.55	84.71±2.90	81.72±0.67
Chemical	RSFR	0.2	PubMedBERT	86.37±0.25	70.68±0.30	77.74±0.19
Chemical	RSFR	0.2	TS-PubMedBERT-Partial-CRF	74.62±2.89	90.38±0.29	81.72±1.77
Chemical	RSFR	0.3	BiLSTM-Partial-CRF	76.01±0.32	64.02±1.32	69.49±0.71
Chemical	RSFR	0.3	EER-PubMedBERT	74.81±1.12	84.78±1.83	79.46±0.46
Chemical	RSFR	0.3	PubMedBERT	84.93±1.05	62.39±0.98	71.92±0.44
Chemical	RSFR	0.3	TS-PubMedBERT-Partial-CRF	74.00±2.33	88.73±0.90	80.67±1.21
Chemical	RSFR	0.4	BiLSTM-Partial-CRF	75.01±1.08	58.42±0.91	65.67±0.26
Chemical	RSFR	0.4	EER-PubMedBERT	75.27±1.92	79.29±2.13	77.18±0.44
Chemical	RSFR	0.4	PubMedBERT	82.22±1.92	57.94±2.30	67.93±1.58
Chemical	RSFR	0.4	TS-PubMedBERT-Partial-CRF	74.15±0.72	85.84±1.10	79.56±0.62
Chemical	RSFR	0.5	BiLSTM-Partial-CRF	75.49±0.73	50.19±1.00	60.28±0.49
Chemical	RSFR	0.5	EER-PubMedBERT	76.85±1.29	71.56±0.64	74.10±0.35
Chemical	RSFR	0.5	PubMedBERT	82.61±1.41	49.76±1.05	62.11±1.10
Chemical	RSFR	0.5	TS-PubMedBERT-Partial-CRF	73.23±2.29	81.50±1.19	77.11±1.23
Chemical	RSFR	0.6	BiLSTM-Partial-CRF	74.99±0.75	42.14±0.62	53.96±0.42
Chemical	RSFR	0.6	EER-PubMedBERT	77.12±0.66	64.64±1.34	70.32±0.96
Chemical	RSFR	0.6	PubMedBERT	82.38±1.20	38.11±1.66	52.08±1.35
Chemical	RSFR	0.6	TS-PubMedBERT-Partial-CRF	72.62±3.65	76.28±3.28	74.24±0.99
Chemical	RSFR	0.7	BiLSTM-Partial-CRF	74.98±1.32	34.84±1.33	47.55±1.26
Chemical	RSFR	0.7	EER-PubMedBERT	77.57±1.57	54.80±2.87	64.15±1.53
Chemical	RSFR	0.7	PubMedBERT	82.13±1.59	30.29±2.97	44.16±3.22
Chemical	RSFR	0.7	TS-PubMedBERT-Partial-CRF	70.35±3.82	72.82±3.51	71.41±1.61
Chemical	RSFR	0.8	BiLSTM-Partial-CRF	76.64±0.54	25.43±0.24	38.19±0.28
Chemical	RSFR	0.8	EER-PubMedBERT	77.21±2.53	45.08±1.18	56.90±1.05
Chemical	RSFR	0.8	PubMedBERT	77.16±1.82	19.09±1.08	30.60±1.49
Chemical	RSFR	0.8	TS-PubMedBERT-Partial-CRF	74.37±4.58	62.55±4.15	67.72±1.84

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Dataset	Scheme	Rate	Model	P	R	F1
Chemical	RSFR	0.9	BiLSTM-Partial-CRF	75.85±1.63	13.81±0.68	23.35±0.93
Chemical	RSFR	0.9	EER-PubMedBERT	77.61±1.38	35.46±1.44	48.66±1.45
Chemical	RSFR	0.9	PubMedBERT	70.53±7.73	8.83±1.78	15.64±2.90
Chemical	RSFR	0.9	TS-PubMedBERT-Partial-CRF	73.89±1.53	46.85±1.84	57.30±1.02
Disease	RAR	0.1	BiLSTM-Partial-CRF	77.19±0.37	82.62±0.56	79.81±0.12
Disease	RAR	0.1	EER-PubMedBERT	80.87±1.20	87.81±0.59	84.19±0.44
Disease	RAR	0.1	PubMedBERT	83.32±0.75	84.54±1.79	83.91±0.54
Disease	RAR	0.1	TS-PubMedBERT-Partial-CRF	79.51±1.11	88.48±0.65	83.75±0.35
Disease	RAR	0.2	BiLSTM-Partial-CRF	77.50±0.59	81.87±0.78	79.62±0.23
Disease	RAR	0.2	EER-PubMedBERT	81.31±1.37	87.36±0.41	84.22±0.71
Disease	RAR	0.2	PubMedBERT	83.50±0.84	83.08±1.53	83.27±0.38
Disease	RAR	0.2	TS-PubMedBERT-Partial-CRF	79.39±0.85	88.31±0.20	83.61±0.45
Disease	RAR	0.3	BiLSTM-Partial-CRF	77.21±0.46	81.48±0.28	79.28±0.27
Disease	RAR	0.3	EER-PubMedBERT	82.67±0.93	85.89±0.48	84.24±0.26
Disease	RAR	0.3	PubMedBERT	82.39±1.34	81.42±1.04	81.89±0.57
Disease	RAR	0.3	TS-PubMedBERT-Partial-CRF	79.94±0.81	88.35±0.29	83.93±0.47
Disease	RAR	0.4	BiLSTM-Partial-CRF	77.44±0.43	80.75±0.43	79.06±0.26
Disease	RAR	0.4	EER-PubMedBERT	82.53±0.75	85.30±0.56	83.89±0.28
Disease	RAR	0.4	PubMedBERT	82.58±1.99	76.94±3.24	79.64±2.55
Disease	RAR	0.4	TS-PubMedBERT-Partial-CRF	79.98±1.34	87.78±0.36	83.69±0.61
Disease	RAR	0.5	BiLSTM-Partial-CRF	78.19±0.52	78.93±0.49	78.55±0.27
Disease	RAR	0.5	EER-PubMedBERT	82.01±1.52	84.70±1.10	83.31±0.27
Disease	RAR	0.5	PubMedBERT	85.86±1.56	58.51±5.58	69.40±3.52
Disease	RAR	0.5	TS-PubMedBERT-Partial-CRF	80.36±1.31	87.30±0.43	83.68±0.61
Disease	RAR	0.6	BiLSTM-Partial-CRF	78.54±0.86	76.88±0.85	77.69±0.25
Disease	RAR	0.6	EER-PubMedBERT	81.74±1.12	83.83±1.01	82.76±0.24
Disease	RAR	0.6	PubMedBERT	85.68±1.62	45.03±6.91	58.69±5.80
Disease	RAR	0.6	TS-PubMedBERT-Partial-CRF	80.28±1.09	86.39±1.00	83.21±0.28
Disease	RAR	0.7	BiLSTM-Partial-CRF	79.20±0.67	70.18±1.98	74.40±1.19
Disease	RAR	0.7	EER-PubMedBERT	81.35±1.10	82.22±1.01	81.77±0.56
Disease	RAR	0.7	PubMedBERT	85.16±0.45	26.40±1.68	40.27±1.96
Disease	RAR	0.7	TS-PubMedBERT-Partial-CRF	80.72±1.27	85.18±0.48	82.88±0.66
Disease	RAR	0.8	BiLSTM-Partial-CRF	73.55±4.45	37.96±9.51	49.55±8.71
Disease	RAR	0.8	EER-PubMedBERT	80.32±0.82	80.94±1.51	80.61±0.39
Disease	RAR	0.8	PubMedBERT	82.40±1.90	15.28±2.13	25.71±3.03
Disease	RAR	0.8	TS-PubMedBERT-Partial-CRF	80.38±1.70	83.19±1.06	81.73±0.42
Disease	RAR	0.9	BiLSTM-Partial-CRF	71.04±8.76	9.29±6.82	15.50±9.36

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Dataset	Scheme	Rate	Model	P	R	F1
Disease	RAR	0.9	EER-PubMedBERT	79.13±0.85	78.09±0.75	78.60±0.43
Disease	RAR	0.9	PubMedBERT	82.07±4.90	5.19±1.33	9.73±2.36
Disease	RAR	0.9	TS-PubMedBERT-Partial-CRF	79.32±1.60	81.41±1.55	80.32±0.64
Disease	RSFR	0.1	BiLSTM-Partial-CRF	75.91±0.50	76.15±0.81	76.03±0.46
Disease	RSFR	0.1	EER-PubMedBERT	81.61±1.10	85.43±1.25	83.46±0.43
Disease	RSFR	0.1	PubMedBERT	83.99±1.07	77.54±1.15	80.62±0.49
Disease	RSFR	0.1	TS-PubMedBERT-Partial-CRF	79.44±0.58	87.07±0.81	83.08±0.40
Disease	RSFR	0.2	BiLSTM-Partial-CRF	75.44±0.62	70.07±1.32	72.65±0.58
Disease	RSFR	0.2	EER-PubMedBERT	79.57±1.43	84.22±1.53	81.80±0.28
Disease	RSFR	0.2	PubMedBERT	82.31±0.80	69.39±0.52	75.29±0.51
Disease	RSFR	0.2	TS-PubMedBERT-Partial-CRF	79.08±0.63	86.28±1.29	82.51±0.53
Disease	RSFR	0.3	BiLSTM-Partial-CRF	73.19±0.72	63.97±0.71	68.27±0.42
Disease	RSFR	0.3	EER-PubMedBERT	77.25±0.57	82.83±0.64	79.94±0.37
Disease	RSFR	0.3	PubMedBERT	80.54±1.95	61.22±0.85	69.56±1.10
Disease	RSFR	0.3	TS-PubMedBERT-Partial-CRF	79.02±0.96	83.50±0.70	81.20±0.75
Disease	RSFR	0.4	BiLSTM-Partial-CRF	71.83±0.79	58.94±1.38	64.73±0.62
Disease	RSFR	0.4	EER-PubMedBERT	75.79±1.02	80.53±0.97	78.08±0.44
Disease	RSFR	0.4	PubMedBERT	79.21±0.99	51.62±1.11	62.49±0.63
Disease	RSFR	0.4	TS-PubMedBERT-Partial-CRF	79.49±1.18	83.13±0.67	81.26±0.59
Disease	RSFR	0.5	BiLSTM-Partial-CRF	68.23±1.08	53.84±0.32	60.18±0.47
Disease	RSFR	0.5	EER-PubMedBERT	74.80±1.58	78.37±1.84	76.51±0.57
Disease	RSFR	0.5	PubMedBERT	78.19±1.00	43.21±0.34	55.65±0.35
Disease	RSFR	0.5	TS-PubMedBERT-Partial-CRF	80.14±0.86	80.18±0.82	80.16±0.81
Disease	RSFR	0.6	BiLSTM-Partial-CRF	67.50±0.65	48.32±0.39	56.32±0.34
Disease	RSFR	0.6	EER-PubMedBERT	73.96±1.16	68.23±2.49	70.93±1.05
Disease	RSFR	0.6	PubMedBERT	75.11±2.37	34.38±1.30	47.13±1.19
Disease	RSFR	0.6	TS-PubMedBERT-Partial-CRF	78.60±1.49	77.10±1.78	77.81±0.30
Disease	RSFR	0.7	BiLSTM-Partial-CRF	65.33±1.77	40.54±0.75	50.03±1.06
Disease	RSFR	0.7	EER-PubMedBERT	71.10±1.33	58.98±3.43	64.40±1.82
Disease	RSFR	0.7	PubMedBERT	73.14±2.26	27.05±2.06	39.45±2.30
Disease	RSFR	0.7	TS-PubMedBERT-Partial-CRF	77.88±1.40	72.00±1.41	74.81±1.15
Disease	RSFR	0.8	BiLSTM-Partial-CRF	63.93±2.80	31.13±1.80	41.77±0.93
Disease	RSFR	0.8	EER-PubMedBERT	70.78±1.86	54.49±4.10	61.45±2.26
Disease	RSFR	0.8	PubMedBERT	67.93±2.45	17.36±1.24	27.62±1.52
Disease	RSFR	0.8	TS-PubMedBERT-Partial-CRF	77.58±1.39	71.18±3.85	74.18±2.11
Disease	RSFR	0.9	BiLSTM-Partial-CRF	58.21±4.42	18.51±5.61	27.46±5.89
Disease	RSFR	0.9	EER-PubMedBERT	70.67±1.51	45.43±3.96	55.19±2.89

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Dataset	Scheme	Rate	Model	P	R	F1
Disease	RSFR	0.9	PubMedBERT	61.52±4.37	7.07±1.21	12.64±1.92
Disease	RSFR	0.9	TS-PubMedBERT-Partial-CRF	76.12±2.52	67.92±5.52	71.71±3.94
Gene	RAR	0.1	BiLSTM-Partial-CRF	69.66±0.33	76.97±0.42	73.13±0.12
Gene	RAR	0.1	EER-PubMedBERT	71.22±0.23	83.48±0.31	76.86±0.23
Gene	RAR	0.1	PubMedBERT	75.22±0.47	79.05±0.64	77.08±0.16
Gene	RAR	0.1	TS-PubMedBERT-Partial-CRF	59.81±1.06	78.24±0.90	67.79±0.86
Gene	RAR	0.2	BiLSTM-Partial-CRF	70.12±0.44	76.41±0.38	73.13±0.16
Gene	RAR	0.2	EER-PubMedBERT	71.60±0.42	83.10±0.17	76.92±0.29
Gene	RAR	0.2	PubMedBERT	76.67±0.90	74.37±1.83	75.48±0.56
Gene	RAR	0.2	TS-PubMedBERT-Partial-CRF	59.83±0.83	78.03±0.49	67.73±0.68
Gene	RAR	0.3	BiLSTM-Partial-CRF	71.64±0.79	74.17±0.77	72.87±0.14
Gene	RAR	0.3	EER-PubMedBERT	72.54±0.38	82.65±0.22	77.26±0.14
Gene	RAR	0.3	PubMedBERT	76.13±0.59	73.05±0.63	74.56±0.44
Gene	RAR	0.3	TS-PubMedBERT-Partial-CRF	60.49±1.22	78.39±1.54	68.28±1.24
Gene	RAR	0.4	BiLSTM-Partial-CRF	72.76±0.74	71.10±0.59	71.92±0.14
Gene	RAR	0.4	EER-PubMedBERT	73.44±0.44	81.82±0.22	77.41±0.19
Gene	RAR	0.4	PubMedBERT	77.50±0.47	66.93±1.64	71.81±0.76
Gene	RAR	0.4	TS-PubMedBERT-Partial-CRF	63.36±1.29	79.51±0.59	70.52±0.96
Gene	RAR	0.5	BiLSTM-Partial-CRF	75.47±0.59	63.00±0.40	68.67±0.22
Gene	RAR	0.5	EER-PubMedBERT	74.39±0.15	80.49±0.27	77.32±0.06
Gene	RAR	0.5	PubMedBERT	78.02±1.00	45.55±6.39	57.22±4.87
Gene	RAR	0.5	TS-PubMedBERT-Partial-CRF	62.69±2.70	78.54±1.79	69.71±2.25
Gene	RAR	0.6	BiLSTM-Partial-CRF	78.61±1.13	46.12±2.73	58.06±1.98
Gene	RAR	0.6	EER-PubMedBERT	74.48±1.18	79.42±1.73	76.84±0.35
Gene	RAR	0.6	PubMedBERT	80.00±0.51	29.11±2.13	42.65±2.23
Gene	RAR	0.6	TS-PubMedBERT-Partial-CRF	65.56±1.88	80.64±1.09	72.31±1.52
Gene	RAR	0.7	BiLSTM-Partial-CRF	73.79±3.63	16.29±1.28	26.67±1.90
Gene	RAR	0.7	EER-PubMedBERT	75.14±0.53	77.54±0.92	76.32±0.22
Gene	RAR	0.7	PubMedBERT	80.06±0.83	18.95±1.58	30.61±2.12
Gene	RAR	0.7	TS-PubMedBERT-Partial-CRF	68.35±0.73	81.45±0.83	74.32±0.57
Gene	RAR	0.8	BiLSTM-Partial-CRF	74.76±3.01	4.46±1.40	8.37±2.48
Gene	RAR	0.8	EER-PubMedBERT	74.69±1.31	76.24±2.09	75.42±0.51
Gene	RAR	0.8	PubMedBERT	78.17±2.32	9.66±0.76	17.19±1.22
Gene	RAR	0.8	TS-PubMedBERT-Partial-CRF	69.15±0.82	81.70±0.78	74.90±0.62
Gene	RAR	0.9	BiLSTM-Partial-CRF	50.85±14.60	0.18±0.13	0.36±0.25
Gene	RAR	0.9	EER-PubMedBERT	76.99±0.78	71.18±1.16	73.96±0.30
Gene	RAR	0.9	PubMedBERT	76.55±2.71	3.52±0.23	6.72±0.43

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Dataset	Scheme	Rate	Model	P	R	F1
Gene	RAR	0.9	TS-PubMedBERT-Partial-CRF	73.52±1.22	77.76±1.04	75.56±0.35
Gene	RSFR	0.1	BiLSTM-Partial-CRF	67.13±0.32	69.92±0.66	68.49±0.24
Gene	RSFR	0.1	EER-PubMedBERT	70.36±0.86	77.95±0.57	73.96±0.71
Gene	RSFR	0.1	PubMedBERT	75.16±0.49	72.29±0.97	73.69±0.31
Gene	RSFR	0.1	TS-PubMedBERT-Partial-CRF	58.47±0.56	77.31±0.62	66.59±0.57
Gene	RSFR	0.2	BiLSTM-Partial-CRF	65.96±0.25	63.21±0.50	64.56±0.19
Gene	RSFR	0.2	EER-PubMedBERT	70.23±0.31	72.58±0.66	71.38±0.30
Gene	RSFR	0.2	PubMedBERT	71.98±0.84	66.67±1.07	69.22±0.74
Gene	RSFR	0.2	TS-PubMedBERT-Partial-CRF	58.30±1.41	75.87±1.54	65.93±1.45
Gene	RSFR	0.3	BiLSTM-Partial-CRF	64.59±0.40	56.63±0.56	60.35±0.30
Gene	RSFR	0.3	EER-PubMedBERT	68.07±1.57	68.80±1.89	68.39±0.23
Gene	RSFR	0.3	PubMedBERT	72.58±1.09	57.95±0.92	64.43±0.29
Gene	RSFR	0.3	TS-PubMedBERT-Partial-CRF	57.65±1.83	74.23±0.88	64.88±1.34
Gene	RSFR	0.4	BiLSTM-Partial-CRF	62.01±0.48	50.99±0.82	55.95±0.38
Gene	RSFR	0.4	EER-PubMedBERT	66.09±1.48	65.70±1.39	65.87±0.45
Gene	RSFR	0.4	PubMedBERT	71.20±2.01	50.85±2.82	59.25±1.60
Gene	RSFR	0.4	TS-PubMedBERT-Partial-CRF	58.77±2.30	73.76±1.26	65.40±1.68
Gene	RSFR	0.5	BiLSTM-Partial-CRF	61.89±1.02	43.72±0.54	51.23±0.26
Gene	RSFR	0.5	EER-PubMedBERT	63.70±3.10	62.38±2.39	62.91±0.52
Gene	RSFR	0.5	PubMedBERT	70.70±2.54	41.86±1.61	52.52±0.91
Gene	RSFR	0.5	TS-PubMedBERT-Partial-CRF	58.44±0.96	69.47±2.01	63.47±1.18
Gene	RSFR	0.6	BiLSTM-Partial-CRF	59.70±0.81	36.23±0.92	45.08±0.50
Gene	RSFR	0.6	EER-PubMedBERT	63.78±2.28	54.88±2.23	58.91±0.54
Gene	RSFR	0.6	PubMedBERT	69.76±1.97	35.32±2.43	46.86±2.45
Gene	RSFR	0.6	TS-PubMedBERT-Partial-CRF	57.52±1.85	65.80±1.73	61.36±1.31
Gene	RSFR	0.7	BiLSTM-Partial-CRF	59.34±1.71	25.22±1.13	35.36±0.88
Gene	RSFR	0.7	EER-PubMedBERT	60.96±2.24	49.71±2.08	54.73±1.68
Gene	RSFR	0.7	PubMedBERT	66.75±1.74	24.39±3.41	35.62±3.93
Gene	RSFR	0.7	TS-PubMedBERT-Partial-CRF	56.37±2.54	63.49±2.89	59.60±0.66
Gene	RSFR	0.8	BiLSTM-Partial-CRF	58.71±1.36	14.47±0.86	23.19±1.06
Gene	RSFR	0.8	EER-PubMedBERT	59.55±1.87	42.34±1.56	49.44±0.76
Gene	RSFR	0.8	PubMedBERT	64.97±1.97	13.76±1.84	22.65±2.52
Gene	RSFR	0.8	TS-PubMedBERT-Partial-CRF	55.44±2.39	58.74±5.04	56.81±1.34
Gene	RSFR	0.9	BiLSTM-Partial-CRF	52.14±6.95	4.08±0.69	7.53±1.12
Gene	RSFR	0.9	EER-PubMedBERT	58.08±1.00	33.03±3.13	42.00±2.52
Gene	RSFR	0.9	PubMedBERT	62.60±3.09	4.48±0.93	8.33±1.61
Gene	RSFR	0.9	TS-PubMedBERT-Partial-CRF	56.08±2.59	49.94±2.42	52.79±2.05

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Dataset	Scheme	Rate	Model	P	R	F1
Species	RAR	0.1	BiLSTM-Partial-CRF	73.45±0.74	71.96±0.85	72.69±0.62
Species	RAR	0.1	EER-PubMedBERT	55.67±2.80	85.64±0.41	67.43±2.01
Species	RAR	0.1	PubMedBERT	77.69±1.15	74.87±1.97	76.22±0.71
Species	RAR	0.1	TS-PubMedBERT-Partial-CRF	56.01±1.04	85.13±0.78	67.56±0.82
Species	RAR	0.2	BiLSTM-Partial-CRF	74.25±0.67	70.67±0.21	72.42±0.35
Species	RAR	0.2	EER-PubMedBERT	55.35±1.42	86.30±0.46	67.43±1.03
Species	RAR	0.2	PubMedBERT	78.19±1.40	73.60±1.43	75.80±0.57
Species	RAR	0.2	TS-PubMedBERT-Partial-CRF	57.83±1.95	85.23±0.60	68.88±1.33
Species	RAR	0.3	BiLSTM-Partial-CRF	75.16±1.16	69.26±0.43	72.08±0.45
Species	RAR	0.3	EER-PubMedBERT	56.55±1.80	85.56±0.54	68.07±1.19
Species	RAR	0.3	PubMedBERT	79.10±1.97	66.96±3.34	72.43±1.28
Species	RAR	0.3	TS-PubMedBERT-Partial-CRF	56.99±2.81	85.97±0.59	68.49±1.94
Species	RAR	0.4	BiLSTM-Partial-CRF	76.04±1.86	68.27±0.83	71.93±0.55
Species	RAR	0.4	EER-PubMedBERT	55.70±3.13	85.63±0.57	67.43±2.16
Species	RAR	0.4	PubMedBERT	79.59±1.83	65.79±4.52	71.89±2.25
Species	RAR	0.4	TS-PubMedBERT-Partial-CRF	57.03±2.80	85.65±1.26	68.40±1.65
Species	RAR	0.5	BiLSTM-Partial-CRF	76.48±1.19	66.32±0.89	71.03±0.84
Species	RAR	0.5	EER-PubMedBERT	58.27±1.47	85.09±0.75	69.16±0.98
Species	RAR	0.5	PubMedBERT	79.26±0.94	57.61±7.44	66.40±4.97
Species	RAR	0.5	TS-PubMedBERT-Partial-CRF	57.91±1.88	85.30±0.60	68.96±1.17
Species	RAR	0.6	BiLSTM-Partial-CRF	84.19±0.38	53.16±0.88	65.17±0.54
Species	RAR	0.6	EER-PubMedBERT	57.85±1.36	84.99±0.24	68.83±0.96
Species	RAR	0.6	PubMedBERT	77.64±2.34	41.73±4.14	54.15±3.58
Species	RAR	0.6	TS-PubMedBERT-Partial-CRF	55.79±2.18	85.33±0.48	67.44±1.48
Species	RAR	0.7	BiLSTM-Partial-CRF	77.22±1.56	59.29±1.08	67.06±0.49
Species	RAR	0.7	EER-PubMedBERT	56.86±2.89	85.05±0.92	68.09±1.83
Species	RAR	0.7	PubMedBERT	77.75±2.76	25.17±2.66	37.95±3.08
Species	RAR	0.7	TS-PubMedBERT-Partial-CRF	53.87±2.74	85.45±0.68	66.03±1.98
Species	RAR	0.8	BiLSTM-Partial-CRF	79.31±2.39	45.40±10.71	56.81±9.81
Species	RAR	0.8	EER-PubMedBERT	58.18±2.32	82.97±0.60	68.37±1.55
Species	RAR	0.8	PubMedBERT	71.62±2.65	16.16±3.95	26.10±5.35
Species	RAR	0.8	TS-PubMedBERT-Partial-CRF	57.78±5.39	82.24±2.72	67.62±2.81
Species	RAR	0.9	BiLSTM-Partial-CRF	78.96±8.18	4.74±3.51	8.72±6.18
Species	RAR	0.9	EER-PubMedBERT	59.94±2.41	78.96±4.71	68.01±1.76
Species	RAR	0.9	PubMedBERT	67.87±5.36	5.20±2.59	9.46±4.20
Species	RAR	0.9	TS-PubMedBERT-Partial-CRF	54.72±5.83	82.40±1.14	65.53±4.31
Species	RSFR	0.1	BiLSTM-Partial-CRF	70.34±2.21	58.33±3.62	63.75±2.99

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Dataset	Scheme	Rate	Model	P	R	F1
Species	RSFR	0.1	EER-PubMedBERT	55.66±1.26	85.59±0.32	67.44±0.84
Species	RSFR	0.1	PubMedBERT	75.18±1.19	62.98±1.82	68.53±1.39
Species	RSFR	0.1	TS-PubMedBERT-Partial-CRF	55.85±1.76	85.76±0.67	67.62±1.11
Species	RSFR	0.2	BiLSTM-Partial-CRF	67.98±1.63	52.81±2.28	59.41±1.66
Species	RSFR	0.2	EER-PubMedBERT	55.79±1.29	85.95±0.30	67.66±1.01
Species	RSFR	0.2	PubMedBERT	74.57±1.72	54.87±3.42	63.15±2.40
Species	RSFR	0.2	TS-PubMedBERT-Partial-CRF	55.42±2.94	85.14±1.03	67.08±2.04
Species	RSFR	0.3	BiLSTM-Partial-CRF	66.37±1.36	46.66±1.68	54.77±1.30
Species	RSFR	0.3	EER-PubMedBERT	56.61±2.23	81.55±2.36	66.76±1.20
Species	RSFR	0.3	PubMedBERT	71.79±2.53	49.93±1.27	58.88±1.51
Species	RSFR	0.3	TS-PubMedBERT-Partial-CRF	56.38±1.82	83.36±2.16	67.24±1.53
Species	RSFR	0.4	BiLSTM-Partial-CRF	66.13±1.50	40.93±0.85	50.56±0.93
Species	RSFR	0.4	EER-PubMedBERT	56.66±1.32	78.84±3.35	65.89±1.50
Species	RSFR	0.4	PubMedBERT	71.94±2.56	43.43±2.17	54.08±1.25
Species	RSFR	0.4	TS-PubMedBERT-Partial-CRF	57.34±3.54	82.03±2.43	67.38±2.19
Species	RSFR	0.5	BiLSTM-Partial-CRF	66.75±2.52	36.66±1.45	47.29±1.27
Species	RSFR	0.5	EER-PubMedBERT	53.89±1.58	76.57±5.06	63.21±2.56
Species	RSFR	0.5	PubMedBERT	69.93±1.97	39.10±1.71	50.10±1.02
Species	RSFR	0.5	TS-PubMedBERT-Partial-CRF	56.52±1.75	79.69±2.98	66.12±1.97
Species	RSFR	0.6	BiLSTM-Partial-CRF	65.83±1.74	32.20±1.17	43.21±0.78
Species	RSFR	0.6	EER-PubMedBERT	53.71±1.44	71.20±6.12	61.04±1.34
Species	RSFR	0.6	PubMedBERT	69.93±2.00	34.03±1.76	45.73±1.32
Species	RSFR	0.6	TS-PubMedBERT-Partial-CRF	55.18±1.77	81.33±3.44	65.74±2.31
Species	RSFR	0.7	BiLSTM-Partial-CRF	65.95±2.09	27.47±0.92	38.76±0.79
Species	RSFR	0.7	EER-PubMedBERT	54.18±0.71	66.57±3.27	59.71±1.67
Species	RSFR	0.7	PubMedBERT	71.19±1.45	26.16±1.94	38.21±2.11
Species	RSFR	0.7	TS-PubMedBERT-Partial-CRF	53.99±4.10	77.92±5.81	63.50±2.30
Species	RSFR	0.8	BiLSTM-Partial-CRF	66.51±3.37	22.56±1.10	33.65±1.26
Species	RSFR	0.8	EER-PubMedBERT	53.77±2.73	60.94±3.52	56.99±1.37
Species	RSFR	0.8	PubMedBERT	65.73±2.86	18.54±1.68	28.84±1.93
Species	RSFR	0.8	TS-PubMedBERT-Partial-CRF	57.67±4.05	71.64±9.56	63.20±2.19
Species	RSFR	0.9	BiLSTM-Partial-CRF	68.68±4.78	12.88±2.70	21.52±3.71
Species	RSFR	0.9	EER-PubMedBERT	49.28±3.44	60.60±1.66	54.24±1.52
Species	RSFR	0.9	PubMedBERT	61.03±4.84	8.73±2.43	15.09±3.44
Species	RSFR	0.9	TS-PubMedBERT-Partial-CRF	50.58±5.85	65.81±4.18	56.88±3.53