

	da	en	et	eu	fi	fr	got	he	hu	ro	sv	
POS	87.37	87.24	84.49	86.09	86.14	90.60	90.44	90.93	88.43	90.64	89.23	
Attributes	98.02	97.74	96.20	97.56	97.09	97.60	96.00	97.84	92.76	97.76	96.88	
Form Emb	70.64	75.13	57.36	65.64	60.38	76.05	68.72	72.68	55.06	73.21	72.72	
Morph	Hard OH	64.69	69.32	57.16	64.51	64.33	72.82	69.94	71.60	61.80	71.36	67.99
	Soft OH	65.43	71.36	58.76	67.02	66.84	73.29	70.86	72.75	61.91	72.03	69.48
	Hard Emb	64.19	69.51	55.53	64.10	62.58	72.28	69.29	71.51	59.62	70.86	67.82
	Soft Emb	65.33	70.75	57.24	66.18	65.04	73.18	70.46	71.85	60.64	71.34	68.60

Table 3: UAS scores for parsers using predicted morphological attributes. The two first rows are POS and averaged attributes prediction accuracy. The third row reports UAS using form representations for comparison purpose. Rows 4 to 7 give UAS using morphological representations, either one-hot or embedding. Regressors output a probability distribution per morphological feature, we either use those soft decision as input for the parser (Soft) or apply argmax first (Hard).

		da	en	et	eu	fi	fr	got	he	hu	ro	sv
Lem	OH	48.09	57.09	25.30	45.96	40.78	64.88	46.85	54.91	27.80	56.89	48.61
	Emb	62.47	70.95	48.17	62.52	59.34	65.62	61.37	64.41	41.59	64.76	65.70
Form	OH	45.12	54.97	21.29	40.53	34.59	61.95	45.19	55.82	25.60	53.83	45.00
	Emb	65.09	71.20	45.79	57.42	52.67	70.81	59.35	66.92	44.30	65.13	64.93
Morph	OH	69.19	72.32	64.06	68.19	71.00	73.92	71.04	72.66	64.31	68.94	69.97
	Emb	68.71	72.22	62.81	67.30	68.70	73.96	70.41	71.77	63.45	68.76	69.69

Table 4: LAS scores for parsers using lemmas (Lem), forms (Form) or morphosyntactic attributes (Morph) representations as features. Representations are either embeddings or one-hot.

		da	en	et	eu	fi	fr	got	he	hu	ro	sv
Form	Emb	65.09	71.20	45.79	57.42	52.67	70.81	59.35	66.92	44.30	64.13	65.93
	hard OH	58.33	62.64	43.80	55.81	54.42	66.66	59.73	63.74	52.41	62.10	60.29
Morph	soft OH	59.68	65.59	47.05	59.43	58.74	67.39	62.36	66.25	53.63	63.26	62.44
	hard Emb	57.72	62.73	42.22	55.06	52.79	66.25	59.14	63.57	49.99	61.67	60.03
	soft Emb	59.13	64.97	45.64	58.25	56.51	67.00	62.02	65.33	52.61	62.65	61.47

Table 5: LAS scores for parsers using predicted morpho-syntactic attributes. First row is LAS using form representation. Rows 2 to 5 are LAS using morphological representation, either one-hot or embedding and either hard decisions or soft decisions.

Appendix A: Supplementary Tables

Table 3 reports results for the predicted attributes experiment. The POS and averaged attributes prediction accuracies are given. Are also reported, scores for the four representation regimes of predicted attributes. Predictions can be either probability distributions (Soft) or argmax (Hard) and either used as such (OH) or passed through an embedding (Emb).

Table 4 reports all the labeled accuracy scores

for parsers using either gold lemmas, forms or gold attributes, either as one-hot vectors or as dense embeddings.

Table 5 reports results for the predicted attributes experiment. Are also reported, scores for the four representation regimes of predicted attributes as in table 4. Predictions can be either probability distributions (Soft) or argmax (Hard) and either used as such (OH) or passed through an embedding (Emb).