

Table 1: Dependency syntax search performance using syntax similarity in Korean corpora. The dependency parsing-type syntactic structure in the syntax reader was used.

			BLEU			Weighted BLEU			ROUGE		
		n-gram	Top1	Top50	Top100	Top1	Top50	Top100	Top1	Top50	Top100
Weather	Non-pretrained BERT	n=1	0.911	0.415	0.331	0.915	0.451	0.339	0.952	0.626	0.463
		n=2	0.841	0.119	0.113	0.863	0.159	0.154			
		n=3	0.757	0.260	0.027	0.787	0.037	0.037			
		n=4	0.619	0.006	0.012	0.634	0.007	0.017			
	Pretrained BERT	n=1	0.931	0.386	0.203	0.938	0.386	0.207	0.965	0.624	0.362
		n=2	0.883	0.098	0.041	0.899	0.133	0.062			
		n=3	0.813	0.019	0.006	0.836	0.027	0.011			
		n=4	0.675	0.003	0.001	0.689	0.005	0.001			
	Pretrained BERT for syntax sentence	n=1	0.936	0.398	0.326	0.937	0.408	0.326	0.968	0.621	0.445
		n=2	0.887	0.113	0.167	0.902	0.113	0.214			
		n=3	0.819	0.022	0.067	0.841	0.022	0.104			
		n=4	0.680	0.003	0.020	0.693	0.003	0.029			
Navi	Non-pretrained BERT	n=1	0.924	0.350	0.287	0.938	0.353	0.287	0.957	0.612	0.381
		n=2	0.870	0.057	0.070	0.884	0.075	0.010			
		n=3	0.755	0.005	0.011	0.768	0.007	0.016			
		n=4	0.431	0.001	0.001	0.436	0.001	0.001			
	Pretrained BERT	n=1	0.946	0.354	0.360	0.964	0.357	0.361	0.970	0.621	0.351
		n=2	0.907	0.073	0.029	0.918	0.092	0.039			
		n=3	0.798	0.004	0.009	0.809	0.006	0.014			
		n=4	0.474	0.001	0.001	0.478	0.001	0.001			
	Pretrained BERT for syntax sentence	n=1	0.945	0.382	0.241	0.974	0.385	0.246	0.969	0.602	0.362
		n=2	0.905	0.073	0.086	0.915	0.094	0.117			
		n=3	0.799	0.005	0.024	0.808	0.008	0.036			
		n=4	0.476	0.001	0.006	0.480	0.001	0.009			
Rest	Non-pretrained BERT	n=1	0.777	0.275	0.111	0.779	0.279	0.123	0.854	0.529	0.242
		n=2	0.572	0.056	0.041	0.627	0.075	0.063			
		n=3	0.361	0.007	0.013	0.414	0.011	0.024			
		n=4	0.187	0.001	0.003	0.206	0.001	0.005			
	Pretrained BERT	n=1	0.851	0.254	0.124	0.854	0.258	0.125	0.903	0.553	0.252
		n=2	0.705	0.051	0.049	0.746	0.066	0.072			
		n=3	0.524	0.006	0.010	0.581	0.010	0.021			
		n=4	0.333	0.001	0.001	0.364	0.001	0.003			
	Pretrained BERT for syntax sentence	n=1	0.848	0.271	0.251	0.887	0.276	0.259	0.904	0.530	0.272
		n=2	0.707	0.051	0.040	0.748	0.068	0.067			
		n=3	0.525	0.008	0.005	0.582	0.011	0.009			
		n=4	0.333	0.001	0.001	0.365	0.001	0.001			

Table 2: Phrase structure syntax search performance using syntax similarity in Korean corpora. The phrase structure parsing-type syntactic structure in the syntax reader was used.

			BLEU			Weighted BLEU			ROUGE		
		n-gram	Top1	Top50	Top100	Top1	Top50	Top100	Top1	Top50	Top100
Weather	Non-Pretrained BERT	n=1	0.933	0.631	0.421	0.939	0.637	0.426	0.921	0.615	0.686
		n=2	0.911	0.545	0.327	0.921	0.586	0.370			
		n=3	0.890	0.472	0.237	0.917	0.567	0.351			
		n=4	0.865	0.394	0.166	0.899	0.501	0.269			
	Pretrained BERT	n=1	0.941	0.641	0.364	0.943	0.643	0.369	0.931	0.615	0.673
		n=2	0.921	0.553	0.268	0.931	0.595	0.312			
		n=3	0.901	0.479	0.207	0.926	0.575	0.307			
		n=4	0.879	0.400	0.146	0.910	0.509	0.229			
	Pretrained BERT for syntax sentence	n=1	0.943	0.636	0.565	0.947	0.636	0.568	0.934	0.634	0.429
		n=2	0.924	0.549	0.485	0.933	0.591	0.523			
		n=3	0.906	0.477	0.410	0.929	0.573	0.497			
		n=4	0.885	0.398	0.332	0.914	0.506	0.438			
Navi	Non-Pretrained BERT	n=1	0.891	0.622	0.310	0.895	0.622	0.316	0.858	0.617	0.565
		n=2	0.842	0.517	0.244	0.865	0.567	0.274			
		n=3	0.802	0.435	0.192	0.854	0.542	0.268			
		n=4	0.759	0.347	0.132	0.819	0.467	0.206			
	Pretrained BERT	n=1	0.953	0.600	0.481	0.954	0.604	0.483	0.949	0.624	0.622
		n=2	0.936	0.498	0.373	0.945	0.546	0.423			
		n=3	0.920	0.416	0.300	0.941	0.523	0.404			
		n=4	0.901	0.329	0.225	0.927	0.447	0.329			
	Pretrained BERT for syntax sentence	n=1	0.955	0.604	0.357	0.955	0.638	0.365	0.954	0.626	0.811
		n=2	0.939	0.500	0.282	0.947	0.549	0.317			
		n=3	0.925	0.417	0.233	0.944	0.526	0.322			
		n=4	0.907	0.329	0.171	0.931	0.449	0.252			
Rest	Non-Pretrained BERT	n=1	0.867	0.874	0.442	0.446	0.080	0.097	0.858	0.542	0.203
		n=2	0.825	0.360	0.073	0.846	0.398	0.076			
		n=3	0.790	0.291	0.065	0.837	0.380	0.074			
		n=4	0.754	0.228	0.057	0.806	0.318	0.068			
	Pretrained BERT	n=1	0.879	0.888	0.429	0.488	0.190	0.194	0.867	0.561	0.285
		n=2	0.838	0.858	0.350	0.387	0.160	0.174			
		n=3	0.805	0.849	0.283	0.371	0.133	0.166			
		n=4	0.771	0.820	0.222	0.309	0.105	0.143			
	Pretrained BERT for syntax sentence	n=1	0.882	0.439	0.469	0.886	0.489	0.483	0.876	0.551	0.428
		n=2	0.844	0.355	0.399	0.863	0.395	0.433			
		n=3	0.813	0.285	0.329	0.855	0.376	0.408			
		n=4	0.781	0.222	0.266	0.827	0.313	0.357			

Table 3: POS syntax search performance using syntax similarity in Korean corpora. The POS tagging-type syntactic structure in the syntax reader was used.

			BLEU			Weighted BLEU			ROUGE			
			n-gram	Top1	Top50	Top100	Top1	Top50	Top100	Top1	Top50	Top100
Weather	Non-pretrained BERT	n=1	0.903	0.357	0.337	0.905	0.376	0.373	0.931	0.463	0.360	
		n=2	0.836	0.100	0.101	0.865	0.149	0.154				
		n=3	0.773	0.217	0.009	0.830	0.041	0.016				
		n=4	0.709	0.004	0.004	0.760	0.006	0.006				
	Pretrained BERT	n=1	0.915	0.361	0.181	0.941	0.396	0.184	0.938	0.470	0.219	
		n=2	0.854	0.104	0.014	0.881	0.153	0.019				
		n=3	0.795	0.025	0.007	0.849	0.046	0.012				
		n=4	0.735	0.005	0.001	0.783	0.007	0.002				
Navi	Non-pretrained BERT	n=1	0.922	0.323	0.290	0.929	0.335	0.299	0.942	0.452	0.487	
		n=2	0.868	0.092	0.104	0.892	0.132	0.133				
		n=3	0.813	0.018	0.021	0.856	0.035	0.037				
		n=4	0.739	0.003	0.005	0.778	0.004	0.010				
	Pretrained BERT	n=1	0.931	0.325	0.289	0.938	0.354	0.298	0.948	0.449	0.433	
		n=2	0.888	0.093	0.117	0.907	0.135	0.151				
		n=3	0.842	0.020	0.038	0.880	0.036	0.063				
		n=4	0.772	0.003	0.008	0.805	0.005	0.011				
Rest	Non-pretrained BERT	n=1	0.769	0.265	0.119	0.796	0.267	0.188	0.805	0.459	0.22	
		n=2	0.617	0.069	0.045	0.680	0.107	0.071				
		n=3	0.507	0.017	0.009	0.613	0.035	0.024				
		n=4	0.422	0.005	0.003	0.501	0.009	0.007				
	Pretrained BERT	n=1	0.779	0.263	0.088	0.786	0.269	0.089	0.803	0.457	0.196	
		n=2	0.626	0.068	0.019	0.690	0.104	0.034				
		n=3	0.516	0.017	0.004	0.621	0.035	0.012				
		n=4	0.432	0.004	0.001	0.510	0.008	0.002				

Table 4: Syntax search performance using syntax similarity for joint model in Korean corpora.

			BLEU			Weighted BLEU			ROUGE			
			n-gram	Top1	Top50	Top100	Top1	Top50	Top100	Top1	Top50	Top100
Weather	Non-pretrained BERT	n=1	0.895	0.381	0.125	0.897	0.384	0.218	0.935	0.545	0.245	
		n=2	0.816	0.112	0.007	0.845	0.156	0.009				
		n=3	0.734	0.028	0.002	0.783	0.045	0.003				
		n=4	0.624	0.006	0.004	0.721	0.008	0.005				
	Pretrained BERT	n=1	0.903	0.386	0.267	0.927	0.392	0.296	0.940	0.548	0.290	
		n=2	0.829	0.113	0.048	0.857	0.157	0.062				
		n=3	0.753	0.028	0.007	0.800	0.044	0.013				
		n=4	0.647	0.006	0.002	0.682	0.008	0.002				
Navi	Non-pretrained BERT	n=1	0.923	0.347	0.315	0.937	0.356	0.346	0.951	0.524	0.373	
		n=2	0.869	0.084	0.099	0.888	0.114	0.136				
		n=3	0.785	0.018	0.025	0.815	0.028	0.048				
		n=4	0.585	0.004	0.005	0.607	0.005	0.014				
	Pretrained BERT	n=1	0.924	0.353	0.211	0.942	0.357	0.251	0.948	0.530	0.313	
		n=2	0.873	0.084	0.060	0.891	0.114	0.087				
		n=3	0.791	0.018	0.013	0.819	0.028	0.025				
		n=4	0.593	0.005	0.002	0.614	0.007	0.004				
Rest	Non-pretrained BERT	n=1	0.722	0.326	0.081	0.727	0.364	0.086	0.778	0.489	0.192	
		n=2	0.583	0.159	0.042	0.631	0.192	0.055				
		n=3	0.464	0.103	0.023	0.531	0.139	0.033				
		n=4	0.366	0.076	0.016	0.412	0.108	0.021				
	Pretrained BERT	n=1	0.729	0.330	0.214	0.743	0.340	0.244	0.768	0.501	0.314	
		n=2	0.589	0.164	0.117	0.637	0.196	0.143				
		n=3	0.471	0.107	0.078	0.540	0.146	0.103				
		n=4	0.371	0.079	0.058	0.418	0.112	0.080				

Table 5: Dependency syntax search performance using syntax similarity in English corpora. The dependency parsing-type syntactic structure in the syntax reader was used.

			BLEU			Weighted BLEU			ROUGE		
			n-gram	Top1	Top50	Top100	Top1	Top50	Top100	Top1	Top50
ATIS	Non-pretrained BERT	n=1	0.733	0.443	0.425	0.773	0.452	0.454	0.791	0.480	0.325
		n=2	0.598	0.199	0.131	0.653	0.280	0.215			
		n=3	0.492	0.103	0.022	0.496	0.185	0.046			
		n=4	0.405	0.044	0.009	0.491	0.079	0.013			
	Pretrained BERT	n=1	0.764	0.434	0.216	0.782	0.432	0.261	0.811	0.469	0.269
		n=2	0.635	0.195	0.091	0.687	0.275	0.135			
		n=3	0.539	0.098	0.051	0.635	0.180	0.097			
		n=4	0.457	0.043	0.019	0.652	0.078	0.037			
	Pretrained BERT for syntax sentence	n=1	0.776	0.429	0.231	0.787	0.442	0.249	0.840	0.482	0.292
		n=2	0.651	0.191	0.116	0.704	0.270	0.161			
		n=3	0.555	0.095	0.068	0.651	0.174	0.122			
		n=4	0.468	0.040	0.033	0.555	0.073	0.061			
SNIPS	Non-pretrained BERT	n=1	0.790	0.391	0.387	0.793	0.395	0.389	0.822	0.443	0.367
		n=2	0.624	0.106	0.067	0.693	0.165	0.115			
		n=3	0.494	0.028	0.026	0.612	0.054	0.062			
		n=4	0.405	0.007	0.005	0.491	0.015	0.001			
	Pretrained BERT	n=1	0.811	0.388	0.309	0.831	0.389	0.380	0.845	0.442	0.242
		n=2	0.665	0.106	0.093	0.726	0.166	0.155			
		n=3	0.560	0.026	0.017	0.660	0.050	0.041			
		n=4	0.479	0.009	0.002	0.559	0.014	0.004			
	Pretrained BERT for syntax sentence	n=1	0.811	0.385	0.294	0.831	0.386	0.379	0.843	0.437	0.325
		n=2	0.664	0.105	0.104	0.725	0.166	0.166			
		n=3	0.555	0.026	0.023	0.658	0.053	0.049			
		n=4	0.470	0.008	0.010	0.554	0.015	0.019			
Sim-M	Non-pretrained BERT	n=1	0.803	0.200	0.127	0.832	0.200	0.174	0.794	0.389	0.222
		n=2	0.542	0.036	0.022	0.599	0.036	0.037			
		n=3	0.355	0.007	0.003	0.430	0.007	0.007			
		n=4	0.257	0.001	0.001	0.306	0.002	0.001			
	Pretrained BERT	n=1	0.844	0.179	0.220	0.894	0.197	0.261	0.844	0.412	0.289
		n=2	0.610	0.023	0.053	0.663	0.046	0.085			
		n=3	0.420	0.006	0.004	0.501	0.013	0.007			
		n=4	0.301	0.001	0.001	0.372	0.003	0.001			
	Pretrained BERT for syntax sentence	n=1	0.842	0.223	0.236	0.848	0.292	0.264	0.846	0.389	0.480
		n=2	0.610	0.040	0.056	0.663	0.061	0.077			
		n=3	0.422	0.009	0.009	0.501	0.019	0.005			
		n=4	0.312	0.003	0.003	0.372	0.005	0.006			
Sim-R	Non-pretrained BERT	n=1	0.854	0.229	0.093	0.863	0.292	0.093	0.867	0.405	0.168
		n=2	0.643	0.045	0.017	0.692	0.069	0.032			
		n=3	0.494	0.010	0.002	0.569	0.021	0.004			
		n=4	0.387	0.003	0.001	0.444	0.006	0.001			
	Pretrained BERT	n=1	0.861	0.206	0.065	0.866	0.259	0.069	0.873	0.447	0.185
		n=2	0.661	0.033	0.020	0.709	0.052	0.032			
		n=3	0.516	0.007	0.007	0.589	0.014	0.014			
		n=4	0.407	0.002	0.003	0.465	0.003	0.007			
	Pretrained BERT for syntax sentence	n=1	0.861	0.243	0.178	0.868	0.254	0.187	0.877	0.354	0.216
		n=2	0.664	0.053	0.019	0.710	0.081	0.019			
		n=3	0.521	0.013	0.005	0.594	0.026	0.005			
		n=4	0.411	0.003	0.001	0.469	0.006	0.001			
NLUE	Non-pretrained BERT	n=1	0.793	0.281	0.288	0.803	0.289	0.287	0.832	0.332	0.289
		n=2	0.432	0.045	0.029	0.685	0.066	0.049			
		n=3	0.512	0.007	0.001	0.589	0.012	0.001			
		n=4	0.392	0.002	0.001	0.432	0.004	0.001			
	Pretrained BERT	n=1	0.808	0.296	0.011	0.820	0.296	0.011	0.840	0.374	0.098
		n=2	0.647	0.050	0.003	0.698	0.075	0.006			
		n=3	0.526	0.011	0.002	0.591	0.019	0.002			
		n=4	0.407	0.002	0.001	0.445	0.003	0.001			
	Pretrained BERT for syntax sentence	n=1	0.803	0.308	0.202	0.832	0.327	0.222	0.837	0.366	0.197
		n=2	0.642	0.056	0.015	0.691	0.082	0.027			
		n=3	0.526	0.013	0.001	0.589	0.022	0.001			
		n=4	0.408	0.003	0.001	0.447	0.004	0.001			

Table 6: Phrase structure syntax search performance using syntax similarity in English corpora. The phrase structure parsing-type syntactic structure in the syntax reader was used.

			BLEU			Weighted BLEU			ROUGE		
			n-gram	Top1	Top50	Top100	Top1	Top50	Top100	Top1	Top50
ATIS	Non-pretrained BERT	n=1	0.779	0.608	0.436	0.792	0.621	0.458	0.814	0.586	0.818
		n=2	0.748	0.551	0.383	0.763	0.578	0.408			
		n=3	0.713	0.492	0.336	0.759	0.562	0.417			
		n=4	0.676	0.432	0.288	0.727	0.516	0.355			
	Pretrained BERT	n=1	0.789	0.617	0.696	0.798	0.626	0.698	0.842	0.593	0.662
		n=2	0.767	0.558	0.640	0.778	0.586	0.667			
		n=3	0.739	0.498	0.592	0.776	0.570	0.658			
		n=4	0.709	0.438	0.541	0.750	0.522	0.614			
	Pretrained BERT for syntax sentence	n=1	0.816	0.613	0.346	0.818	0.628	0.346	0.845	0.605	0.399
		n=2	0.792	0.557	0.327	0.804	0.584	0.336			
		n=3	0.763	0.498	0.302	0.801	0.569	0.327			
		n=4	0.733	0.439	0.269	0.755	0.522	0.309			
SNIPS	Non-pretrained BERT	n=1	0.817	0.593	0.386	0.819	0.596	0.389	0.820	0.610	0.374
		n=2	0.777	0.515	0.329	0.796	0.552	0.366			
		n=3	0.729	0.431	0.302	0.786	0.531	0.350			
		n=4	0.680	0.358	0.261	0.748	0.464	0.320			
	Pretrained BERT	n=1	0.861	0.595	0.525	0.869	0.598	0.546	0.859	0.603	0.461
		n=2	0.828	0.517	0.473	0.844	0.554	0.498			
		n=3	0.786	0.432	0.403	0.835	0.532	0.475			
		n=4	0.744	0.358	0.344	0.802	0.465	0.430			
	Pretrained BERT for syntax sentence	n=1	0.865	0.578	0.181	0.867	0.579	0.186	0.846	0.592	0.296
		n=2	0.831	0.505	0.160	0.847	0.540	0.170			
		n=3	0.790	0.433	0.137	0.839	0.523	0.165			
		n=4	0.746	0.365	0.114	0.806	0.462	0.145			
Sim-M	Non-pretrained BERT	n=1	0.855	0.322	0.094	0.859	0.325	0.099	0.823	0.392	0.394
		n=2	0.813	0.244	0.045	0.833	0.279	0.064			
		n=3	0.769	0.183	0.018	0.821	0.258	0.035			
		n=4	0.726	0.137	0.012	0.786	0.205	0.021			
	Pretrained BERT	n=1	0.872	0.313	0.304	0.877	0.318	0.338	0.847	0.421	0.315
		n=2	0.841	0.237	0.226	0.856	0.271	0.261			
		n=3	0.808	0.177	0.161	0.848	0.252	0.246			
		n=4	0.772	0.132	0.112	0.841	0.197	0.169			
	Pretrained BERT for syntax sentence	n=1	0.883	0.300	0.232	0.886	0.305	0.238	0.860	0.428	0.348
		n=2	0.852	0.228	0.184	0.867	0.259	0.206			
		n=3	0.818	0.171	0.142	0.859	0.241	0.195			
		n=4	0.782	0.129	0.110	0.831	0.191	0.159			
Sim-R	Non-pretrained BERT	n=1	0.891	0.314	0.247	0.861	0.343	0.269	0.864	0.419	0.326
		n=2	0.861	0.243	0.169	0.875	0.275	0.203			
		n=3	0.827	0.184	0.111	0.867	0.256	0.188			
		n=4	0.791	0.138	0.069	0.840	0.204	0.129			
	Pretrained BERT	n=1	0.892	0.361	0.218	0.897	0.365	0.242	0.876	0.434	0.367
		n=2	0.866	0.279	0.165	0.878	0.316	0.189			
		n=3	0.835	0.211	0.114	0.871	0.295	0.179			
		n=4	0.803	0.158	0.075	0.847	0.235	0.130			
	Pretrained BERT for syntax sentence	n=1	0.894	0.365	0.371	0.899	0.368	0.375	0.879	0.449	0.468
		n=2	0.868	0.256	0.290	0.881	0.322	0.327			
		n=3	0.838	0.219	0.211	0.874	0.301	0.305			
		n=4	0.806	0.166	0.147	0.849	0.242	0.236			
NLUE	Non-pretrained BERT	n=1	0.763	0.502	0.331	0.767	0.509	0.379	0.770	0.515	0.338
		n=2	0.713	0.419	0.243	0.737	0.458	0.283			
		n=3	0.658	0.338	0.174	0.722	0.433	0.269			
		n=4	0.604	0.267	0.124	0.679	0.368	0.200			
	Pretrained BERT	n=1	0.836	0.494	0.386	0.839	0.497	0.389	0.844	0.520	0.452
		n=2	0.797	0.411	0.295	0.816	0.450	0.337			
		n=3	0.754	0.330	0.212	0.806	0.425	0.321			
		n=4	0.712	0.259	0.150	0.771	0.359	0.240			
	Pretrained BERT for syntax sentence	n=1	0.839	0.506	0.503	0.840	0.562	0.505	0.845	0.525	0.403
		n=2	0.800	0.420	0.417	0.819	0.460	0.457			
		n=3	0.756	0.334	0.333	0.808	0.434	0.427			
		n=4	0.714	0.261	0.242	0.774	0.365	0.358			

Table 7: POS syntax search performance using syntax similarity in English corpora. The POS tagging-type syntactic structure in the syntax reader was used.

			BLEU			Weighted BLEU			ROUGE		
			n-gram	Top1	Top50	Top100	Top1	Top50	Top100	Top1	Top50
ATIS	Non-pretrained BERT	n=1	0.768	0.472	0.343	0.784	0.487	0.348	0.820	0.506	0.677
		n=2	0.661	0.269	0.170	0.709	0.346	0.232			
		n=3	0.546	0.158	0.084	0.653	0.264	0.161			
		n=4	0.438	0.074	0.014	0.546	0.127	0.023			
	Pretrained BERT	n=1	0.800	0.484	0.407	0.881	0.487	0.470	0.855	0.512	0.482
		n=2	0.696	0.274	0.219	0.742	0.354	0.292			
		n=3	0.596	0.158	0.091	0.693	0.266	0.197			
		n=4	0.509	0.072	0.008	0.603	0.127	0.017			
SNIPS	Non-pretrained BERT	n=1	0.794	0.408	0.129	0.797	0.419	0.139	0.828	0.458	0.233
		n=2	0.652	0.149	0.086	0.712	0.218	0.086			
		n=3	0.522	0.043	0.038	0.638	0.086	0.038			
		n=4	0.428	0.012	0.011	0.524	0.023	0.011			
	Pretrained BERT	n=1	0.813	0.410	0.275	0.832	0.414	0.279	0.848	0.457	0.301
		n=2	0.686	0.157	0.094	0.741	0.227	0.146			
		n=3	0.578	0.048	0.024	0.689	0.100	0.052			
		n=4	0.487	0.013	0.007	0.583	0.025	0.014			
Sim-M	Non-pretrained BERT	n=1	0.841	0.156	0.179	0.844	0.165	0.194	0.849	0.307	0.466
		n=2	0.636	0.048	0.060	0.683	0.070	0.076			
		n=3	0.436	0.011	0.001	0.522	0.023	0.002			
		n=4	0.321	0.002	0.001	0.389	0.004	0.003			
	Pretrained BERT	n=1	0.852	0.163	0.065	0.875	0.168	0.065	0.865	0.317	0.255
		n=2	0.644	0.052	0.014	0.690	0.073	0.020			
		n=3	0.449	0.012	0.002	0.534	0.022	0.003			
		n=4	0.332	0.003	0.001	0.403	0.006	0.001			
Sim-R	Non-pretrained BERT	n=1	0.864	0.199	0.133	0.872	0.240	0.152	0.878	0.332	0.268
		n=2	0.674	0.060	0.032	0.718	0.088	0.044			
		n=3	0.520	0.014	0.010	0.599	0.028	0.020			
		n=4	0.410	0.003	0.002	0.475	0.006	0.003			
	Pretrained BERT	n=1	0.866	0.221	0.077	0.882	0.221	0.078	0.880	0.338	0.259
		n=2	0.680	0.070	0.019	0.723	0.102	0.029			
		n=3	0.529	0.017	0.005	0.605	0.034	0.011			
		n=4	0.426	0.004	0.001	0.480	0.007	0.001			
NLUE	Non-pretrained BERT	n=1	0.772	0.311	0.292	0.781	0.315	0.297	0.815	0.385	0.288
		n=2	0.622	0.092	0.054	0.673	0.130	0.101			
		n=3	0.493	0.024	0.005	0.567	0.041	0.012			
		n=4	0.373	0.006	0.001	0.420	0.001	0.002			
	Pretrained BERT	n=1	0.806	0.308	0.014	0.862	0.367	0.153	0.845	0.385	0.215
		n=2	0.673	0.095	0.050	0.719	0.132	0.071			
		n=3	0.548	0.024	0.013	0.620	0.040	0.027			
		n=4	0.420	0.005	0.001	0.467	0.008	0.003			

Table 8: Syntax search performance using syntax similarity for joint model in English corpora.

			BLEU			Weighted BLEU			ROUGE		
			n-gram	Top1	Top50	Top100	Top1	Top50	Top100	Top1	Top50
ATIS	Non-pretrained BERT	n=1	0.786	0.504	0.272	0.787	0.563	0.287	0.855	0.520	0.354
		n=2	0.700	0.340	0.181	0.737	0.400	0.215			
		n=3	0.625	0.249	0.132	0.703	0.333	0.181			
		n=4	0.553	0.183	0.099	0.628	0.239	0.132			
	Pretrained BERT	n=1	0.804	0.506	0.358	0.836	0.538	0.384	0.857	0.522	0.425
		n=2	0.718	0.338	0.256	0.755	0.400	0.296			
		n=3	0.646	0.250	0.178	0.723	0.335	0.247			
		n=4	0.580	0.184	0.127	0.654	0.241	0.174			
SNIPS	Non-pretrained BERT	n=1	0.812	0.458	0.424	0.826	0.477	0.437	0.845	0.508	0.299
		n=2	0.696	0.258	0.239	0.746	0.314	0.301			
		n=3	0.601	0.168	0.149	0.694	0.226	0.208			
		n=4	0.525	0.124	0.106	0.605	0.165	0.141			
	Pretrained BERT	n=1	0.825	0.472	0.440	0.847	0.476	0.474	0.859	0.510	0.376
		n=2	0.716	0.264	0.258	0.763	0.321	0.319			
		n=3	0.625	0.171	0.167	0.716	0.232	0.224			
		n=4	0.550	0.126	0.129	0.630	0.169	0.167			
Sim-M	Non-pretrained BERT	n=1	0.850	0.245	0.297	0.859	0.254	0.323	0.849	0.373	0.335
		n=2	0.691	0.120	0.177	0.729	0.149	0.219			
		n=3	0.552	0.072	0.112	0.620	0.105	0.162			
		n=4	0.467	0.050	0.084	0.525	0.074	0.116			
	Pretrained BERT	n=1	0.856	0.237	0.242	0.859	0.265	0.254	0.860	0.402	0.390
		n=2	0.702	0.117	0.119	0.739	0.144	0.150			
		n=3	0.564	0.072	0.062	0.639	0.104	0.096			
		n=4	0.478	0.051	0.040	0.537	0.074	0.065			
Sim-R	Non-pretrained BERT	n=1	0.868	0.254	0.080	0.881	0.291	0.083	0.078	0.408	0.177
		n=2	0.725	0.122	0.048	0.761	0.151	0.057			
		n=3	0.614	0.073	0.033	0.678	0.108	0.045			
		n=4	0.530	0.050	0.024	0.586	0.076	0.034			
	Pretrained BERT	n=1	0.875	0.256	0.059	0.886	0.273	0.063	0.870	0.418	0.198
		n=2	0.735	0.121	0.036	0.770	0.150	0.043			
		n=3	0.625	0.072	0.025	0.689	0.107	0.034			
		n=4	0.540	0.050	0.018	0.597	0.076	0.025			
NLUE	Non-pretrained BERT	n=1	0.772	0.373	0.101	0.786	0.396	0.101	0.819	0.426	0.211
		n=2	0.634	0.188	0.069	0.678	0.222	0.081			
		n=3	0.530	0.530	0.123	0.049	0.597	0.165			
		n=4	0.436	0.089	0.036	0.486	0.125	0.047			
	Pretrained BERT	n=1	0.808	0.378	0.105	0.823	0.387	0.131	0.844	0.423	0.214
		n=2	0.685	0.191	0.069	0.726	0.227	0.081			
		n=3	0.585	0.125	0.049	0.651	0.167	0.063			
		n=4	0.487	0.091	0.036	0.537	0.127	0.047			