

Table 1: Model Performance Comparison across Different Strategies and Layers

Model	Strategy	Layers	F2-Score	Balanced Accuracy	Precision	Recall	F1-Score
KoSimCSE	Full Text	1	0.668	0.831	0.686	0.678	0.665
		2	0.573	0.762	0.897	0.527	0.661
		3	0.556	0.757	0.785	0.521	0.622
		4	0.363	0.666	0.580	0.334	0.420
		5	0.220	0.611	0.196	0.228	0.210
	Noun Verb Adj	1	0.626	0.800	0.727	0.610	0.656
		2	0.429	0.693	0.845	0.390	0.511
		3	0.569	0.764	0.761	0.535	0.628
		4	0.470	0.714	0.752	0.433	0.542
		5	0.399	0.688	0.498	0.381	0.430
	Noun Verb Only	1	0.424	0.706	0.477	0.421	0.435
		2	0.539	0.749	0.831	0.503	0.610
		3	0.414	0.693	0.815	0.390	0.458
		4	0.270	0.619	0.614	0.238	0.340
		5	0.193	0.587	0.527	0.175	0.228
KR-SBERT	Full Text	1	0.674	0.824	0.784	0.656	0.707
		2	0.640	0.800	0.866	0.605	0.704
		3	0.675	0.821	0.830	0.649	0.721
		4	0.613	0.789	0.828	0.584	0.670
		5	0.614	0.784	0.893	0.570	0.695
	Noun Verb Adj	1	0.667	0.817	0.822	0.641	0.713
		2	0.677	0.822	0.829	0.651	0.724
		3	0.669	0.819	0.799	0.645	0.711
		4	0.599	0.778	0.840	0.560	0.670
		5	0.649	0.807	0.819	0.619	0.702
	Noun Verb Only	1	0.669	0.818	0.816	0.643	0.715
		2	0.653	0.807	0.841	0.619	0.712
		3	0.619	0.790	0.812	0.586	0.677
		4	0.662	0.813	0.834	0.630	0.717
		5	0.673	0.817	0.866	0.637	0.734
DistilUSE	Full Text	1	0.377	0.664	0.845	0.331	0.476
		2	0.422	0.688	0.751	0.381	0.502
		3	0.402	0.677	0.832	0.356	0.499
		4	0.390	0.670	0.901	0.342	0.494
		5	0.347	0.650	0.879	0.301	0.448
	Noun Verb Adj	1	0.392	0.672	0.842	0.347	0.490
		2	0.309	0.634	0.800	0.270	0.397
		3	0.403	0.677	0.832	0.357	0.499
		4	0.333	0.644	0.862	0.291	0.428
		5	0.332	0.645	0.857	0.292	0.421
	Noun Verb Only	1	0.359	0.656	0.849	0.314	0.458
		2	0.176	0.574	0.609	0.149	0.240
		3	0.388	0.671	0.786	0.348	0.474
		4	0.316	0.635	0.888	0.272	0.416
		5	0.377	0.666	0.797	0.336	0.465

Model	Strategy	Layers	F2-Score	Balanced Accuracy	Precision	Recall	F1-Score
Ko-SRoBERTa	Full Text	1	0.639	0.810	0.702	0.633	0.654
		2	0.346	0.656	0.595	0.314	0.407
		3	0.572	0.790	0.552	0.606	0.549
		4	0.372	0.556	0.409	0.366	0.386
		5	0.141	0.562	0.267	0.126	0.171
	Noun Verb Adj	1	0.365	0.686	0.387	0.393	0.352
		2	0.558	0.761	0.740	0.530	0.610
		3	0.373	0.673	0.509	0.351	0.414
		4	0.601	0.788	0.677	0.587	0.626
		5	0.314	0.640	0.583	0.283	0.377
	Noun Verb Only	1	0.427	0.710	0.439	0.430	0.427
		2	0.294	0.641	0.602	0.289	0.314
		3	0.404	0.692	0.490	0.391	0.430
		4	0.178	0.581	0.296	0.162	0.209
		5	0.183	0.585	0.232	0.174	0.199
Qwen	Full Text	1	0.750	0.898	0.474	0.878	0.616
		2	0.791	0.919	0.547	0.890	0.678
		3	0.779	0.847	0.657	0.817	0.728
		4	0.779	0.889	0.546	0.873	0.672
		5	0.748	0.871	0.500	0.854	0.631
	Noun Verb Adj	1	0.675	0.903	0.343	0.890	0.495
		2	0.773	0.911	0.546	0.862	0.668
		3	0.766	0.870	0.528	0.863	0.656
		4	0.752	0.857	0.536	0.837	0.653
		5	0.729	0.837	0.548	0.794	0.648
	Noun Verb Only	1	0.751	0.909	0.463	0.889	0.609
		2	0.750	0.876	0.497	0.859	0.629
		3	0.746	0.922	0.458	0.885	0.603
		4	0.776	0.861	0.598	0.838	0.698
		5	0.710	0.817	0.560	0.761	0.645
BGE-M3	Full Text	1	0.659	0.810	0.897	0.619	0.730
		2	0.676	0.814	0.842	0.628	0.724
		3	0.657	0.810	0.872	0.620	0.724
		4	0.491	0.721	0.936	0.443	0.590
		5	0.638	0.797	0.910	0.594	0.719
	Noun Verb Adj	1	0.691	0.833	0.819	0.666	0.734
		2	0.652	0.818	0.730	0.637	0.677
		3	0.619	0.792	0.834	0.585	0.681
		4	0.585	0.772	0.842	0.544	0.660
		5	0.674	0.827	0.782	0.653	0.709
	Noun Verb Only	1	0.633	0.795	0.893	0.591	0.709
		2	0.620	0.789	0.891	0.578	0.697
		3	0.638	0.798	0.901	0.596	0.715
		4	0.640	0.800	0.876	0.600	0.711
		5	0.550	0.751	0.909	0.502	0.643

Model	Strategy	Layers	F2-Score	Balanced Accuracy	Precision	Recall	F1-Score
MiniLM	Full Text	1	0.444	0.696	0.905	0.395	0.548
		2	0.440	0.698	0.709	0.404	0.509
		3	0.407	0.678	0.935	0.358	0.514
		4	0.384	0.668	0.906	0.337	0.486
		5	0.407	0.680	0.919	0.362	0.504
	Noun Verb Adj	1	0.322	0.645	0.563	0.292	0.383
		2	0.449	0.704	0.758	0.414	0.521
		3	0.435	0.698	0.778	0.402	0.503
		4	0.453	0.700	0.918	0.402	0.559
		5	0.268	0.620	0.495	0.244	0.317
	Noun Verb Only	1	0.354	0.657	0.779	0.316	0.433
		2	0.521	0.737	0.845	0.477	0.607
		3	0.312	0.635	0.904	0.270	0.408
		4	0.360	0.657	0.760	0.319	0.447
		5	0.519	0.737	0.794	0.480	0.594