

CS 446 Report

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10th November '23

Analysis Question 1)

	QL	BM25		DPR	
23849	0.0151	0.0186	23.2%	0.2391	1483.4%
42255	0.1987	0.2625	32.1%	0.4411	122%
47210	0.1997	0.2021	1.2%	0.3692	84.9%
67316	0.008	0.0151	88.8%	0.0853	966.3%
118440	0.0041	0.0048	17.1%	0.0084	104.9%
121171	0.6916	0.6956	0.6%	0.2195	-68.3%
135802	0.1164	0.1176	1%	0.0546	-53.1%
141630	0.3959	0.469	18.5%	0.4309	8.8%
156498	0.0564	0.0701	24.3%	0.1348	139%
169208	0.1319	0.1075	-18.5%	0.1028	-22.1%
174463	0.0041	0.0301	634.1%	0.1838	4382.9%
258062	0.0314	0.0317	1%	0.164	422.3%
324585	0.0449	0.0369	-17.8%	0.3791	744.3%
330975	0.1675	0.2357	40.7%	0.5441	224.8%
332593	0.2522	0.231	-8.4%	0.2221	-11.9%
336901	0.0634	0.0634	0%	0.1708	169.4%
390360	0.3275	0.2741	-16.3%	0.2375	-27.5%
405163	0.0787	0.0735	-6.6%	0.0013	-98.3%
555530	0.0084	0.0134	59.5%	0.2544	2928.6%
583468	0.6706	0.7267	8.4%	0.7084	5.6%
640502	0.1199	0.0878	-26.8%	0.188	56.8%
673670	0.0324	0.0416	28.4%	0.0009	-97.2%
701453	0.5663	0.5531	-2.3%	0.316	-44.2%
730539	0.2034	0.1356	-33.3%	0.1628	-20%
768208	0.2353	0.2433	3.4%	0.0623	-73.5%
877809	0.1914	0.2516	31.5%	0.2097	9.6%
911232	0.2038	0.1542	-24.3%	0.1592	-21.9%
914916	0.3638	0.286	-21.4%	0.4061	11.6%
938400	0.166	0.1043	-37.2%	0.3848	131.8%

940547	0.0868	0.0892	2.8%	0.3152	263.1%
940548	0	0	0%	0	0%
997622	0.0748	0.0524	-29.9%	0.1313	75.5%
1030303	0.5014	0.5014	0%	0.1939	-61.3%
1037496	0.4259	0.3181	-25.3%	0.2945	-30.9%
1043135	0.1128	0.1031	-8.6%	0.1281	13.6%
1049519	0	0	0%	0	0%
1051399	0.0201	0.0113	-43.8%	0.1348	570.6%
1056416	0	0	0%	0	0%
1064670	0.2233	0.2312	3.5%	0.1521	-31.9%
1071750	0.2587	0.2685	3.8%	0.2944	13.8%
1103153	0	0	0%	0	0%
1105792	0.3999	0.384	-4%	0.1988	-50.3%
1106979	0.634	0.5034	-20.6%	0.5401	-14.8%
1108651	0.0547	0.025	-54.3%	0.2464	350.5%
1108729	0	0	0%	0	0%
1109707	0.1502	0.175	16.5%	0.1376	-8.4%
1110678	0.4205	0.3262	-22.4%	0.0201	-95.2%
1113256	0.4953	0.4969	0.3%	0.4651	-6.1%
1115210	0.0915	0.0887	-3.1%	0.0651	-28.9%
1116380	0.0396	0.0111	-72%	0.0587	48.2%
1119543	0	0	0%	0	0%
1121353	0.2557	0.2349	-8.1%	0.1002	-60.8%
1122767	0.346	0.3235	-6.5%	0.2052	-40.7%
1127540	0.2693	0.2764	2.6%	0.1705	-36.7%
1131069	0.0288	0.0856	197.2%	0.2143	644.1%
1132532	0.1666	0.1044	-37.3%	0.2442	46.6%
1133579	0.6677	0.6666	-0.2%	0.753	12.8%
1136043	0.0976	0.1569	60.8%	0.3695	278.6%
1136047	0.0666	0.0464	-30.3%	0.0623	-6.5%
1136769	0	0	0%	0	0%
1136962	0.4689	0.4879	4.1%	0.4199	-10.4%
all	0.1952	0.1886	-3.4%	0.2091	7.1%

Analysis Question 2

The table compares QL, BM25, and DPR for information retrieval. We can see that BM25 consistently outperforms QL, as it benefits from better handling of term frequency and document length. DPR shows improvements over QL, highlighting its effectiveness. The lower average scores for BM25, which is not expected, suggest nuanced considerations. In real-world use, method choice depends on task specifics, data nature, and computational resources, with DPR's powerful semantic matching weighed against potential resource demands.

Analysis Question 3

When there are no retrieved documents for a query, relevant documents are zero, which results in a division by zero issue in the AP formula. This is why calculating MAP for a query with no retrieved documents can be considered a challenging or ill-posed question. In practice, when there are no relevant documents retrieved for a query, the precision at any cutoff is zero, leading to an AP of zero. It may be a hard question as some argue that MAP should be undefined or set to zero in such cases, as there is no relevant information to evaluate. Others might argue for a small non-zero default value to avoid mathematical issues.

For me, I think the MAP should be zero as it is the algorithm's fault when it does not detect relevant documents, giving the avg precision as 0.