CHAPTER 19

Information Retrieval

Solutions to Practice Exercises

19.1 We do not consider the questions containing neither of the keywords as their relevance to the keywords is zero. The number of words in a question include stop words. We use the equations given in Section 19.2.1 to compute relevance; the log term in the equation is assumed to be to the base 2.

Q#	#wo--rds	# "SQL"	#"rela--tion"	"SQL" term freq.	"relation" term freq.	"SQL" relv.	"relation" relv.	Tota relv.
1	84	1	1	0.0170	0.0170	0.0002	0.0002	0.0004
4	22	0	1	0.0000	0.0641	0.0000	0.0029	0.0029
5	46	1	1	0.0310	0.0310	0.0006	0.0006	0.0013
6	22	1	0	0.0641	0.0000	0.0029	0.0000	0.0029
7	33	1	1	0.0430	0.0430	0.0013	0.0013	0.0026
8	32	1	3	0.0443	0.1292	0.0013	0.0040	0.0054
9	77	0	1	0.0000	0.0186	0.0000	0.0002	0.0002
14	30	1	0	0.0473	0.0000	0.0015	0.0000	0.0015
15	26	1	1	0.0544	0.0544	0.0020	0.0020	0.0041

19.2 Let S be a set of n keywords. An algorithm to find all documents that contain at least k of these keywords is given below :

This algorithm calculates a reference count for each document identifier. A reference count of i for a document identifier d means that at least i of the keywords in S occur in the document identified by d. The algorithm maintains a

list of records, each having two fields – a document identifier, and the reference count for this identifier. This list is maintained sorted on the document identifier field.

```
initialize the list L to the empty list;
for (each keyword c in S) do
begin
   D := the list of documents identifiers corresponding to c;
   for (each document identifier d in D) do
      if (a record R with document identifier as d is on list L) then
            R.reference_count := R.reference_count + 1;
      else begin
            make a new record R;
            R.document_id := d;
            R.reference_count := 1;
            add R to L;
      end;
end;
for (each record R in L) do
   if (R.reference_count >= k) then
      output R;
```

Note that execution of the second *for* statement causes the list D to "merge" with the list L. Since the lists L and D are sorted, the time taken for this merge is proportional to the sum of the lengths of the two lists. Thus the algorithm runs in time (at most) proportional to n times the sum total of the number of document identifiers corresponding to each keyword in S.

19.3 No answer

19.4 No answer

19.5 No answer