Session 2. GSP: Apriori-Based Sequential Pattern Mining

GSP: Apriori-Based Sequential Pattern Mining

- Initial candidates: All singleton sequences
  - <a>, <b>, <c>, <d>, <e>, <f>, <g>, <h>
- Scan DB once, count support for each candidate
- Generate length-2 candidate sequences

SID	Sequence
10	<(bd)cb(ac)>
20	<(bf)(ce)b(fg)>
30	<(ah)(bf)abf>
40	<(be)(ce)d>
50	<a(bd)bcb(ade)>

min_sup = 2

Cand.	sup
<a>	3
<b>	5
<c>	4
<d>	3
<e>	3
<f>	2
~~<g>~~	1
~~<h>~~	1

	<a>	<b>	<c>	<d>	<e>	<f>
<a>	<aa>	<ab>	<ac>	<ad>	<ae>	<af>
<b>	<ba>	<bb>	<bc>	<bd>	<be>	<bf>
<c>	<ca>	<cb>	<cc>	<cd>	<ce>	<cf>
<d>	<da>	<db>	<dc>	<dd>	<de>	<df>
<e>	<ea>	<eb>	<ec>	<ed>	<ee>	<ef>
<f>	<fa>	<fb>	<fc>	<fd>	<fe>	<ff>

	<a>	<b>	<c>	<d>	<e>	<f>
<a>		<(ab)>	<(ac)>	<(ad)>	<(ae)>	<(af)>
<b>			<(bc)>	<(bd)>	<(be)>	<(bf)>
<c>				<(cd)>	<(ce)>	<(cf)>
<d>					<(de)>	<(df)>
<e>						<(ef)>
<f>						

- Length-2 candidates: 36 + 15= 51
- Without Apriori pruning: 8*8+8*7/2=92 candidates

GSP (Generalized Sequential Patterns): Srikant & Agrawal @ EDBT’96)

GSP Mining and Pruning

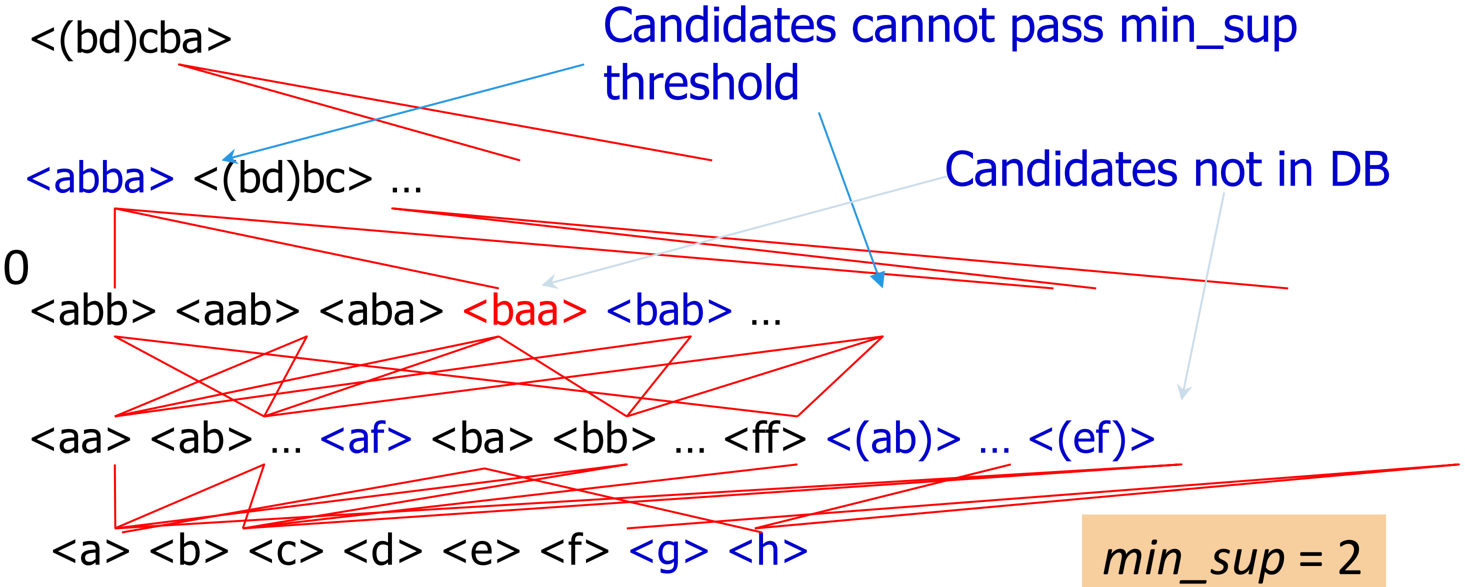
5th scan: 1 cand. 1 length-5 seq. pat.

4th scan: 8 cand. 6 length-4 seq. pat.

3rd scan: 46 cand. 19 length-3 seq. pat. 20 cand. not in DB at all

2nd scan: 51 cand. 19 length-2 seq. pat. 10 cand. not in DB at all

1st scan: 8 cand. 6 length-1 seq. pat.


<(bd)cba>
<abba> <(bd)bc> …
<abb> <aab> <aba> <baa> <bab> …
<aa> <ab> … <af> <ba> <bb> … <ff> <(ab)> … <(ef)>
<a> <b> <c> <d> <e> <f> <g> <h>

Candidates cannot pass min_sup threshold

Candidates not in DB

- ❑ Repeat (for each level (i.e., length-k))
  - ❑ Scan DB to find length-k frequent sequences
  - ❑ Generate length-(k+1) candidate sequences from length-k frequent sequences using Apriori
  - ❑ set k = k+1
- ❑ Until no frequent sequence or no candidate can be found

min_sup = 2

SID	Sequence
10	<(bd)cb(ac)>
20	<(bf)(ce)b(fg)>
30	<(ah)(bf)abf>
40	<(be)(ce)d>
50	<a(bd)bcb(ade)>