How to compute canonical covers of functional dependency, F

- WATCH Video:
  - https://youtu.be/6IGSAOJWqVY

RECALL

Example : attribute closure

SC → PMG SL → C CT → L TL → C SP → C

What is the closure of SL ?

start with ans = {SL}

using 2nd FD, ans = {SLC}

using 1st FD, ans = {SLCPMG}

no more attributes can be added so (SL)+ is SLCPMG

Is SL a key for R(SCPMGLT)?

no, SL ↛ T

Does SL → PG?

yes, because PG are in $(SL)^+$

RECALL

Example: is AG a key for R ?

- $R = (A, B, C, G, H, I)$
- $F = \{A \rightarrow B; A \rightarrow C; CG \rightarrow H; CG \rightarrow I; B \rightarrow H\}$
- Find $(AG)^+$
  1. $result = AG$
  2. $result = ABCG$ $(A \rightarrow C$ and $A \rightarrow B)$
  3. $result = ABCGH$ $(CG \rightarrow H$ and $CG \subseteq AGBC)$
  4. $result = ABCGHI$ $(CG \rightarrow I$ and $CG \subseteq AGBCH)$
- Is AG a candidate key?
  1. Is AG a key? Yes since $(AG)^+ = R$
  2. Is any subset of AG a key?
     1. Does $A \rightarrow R$? *no*
     2. Does $G \rightarrow R$? no

  So AG is a candidate key.

...more examples

1. Given the Relation R (A,B,C,D,E) with functional dependencies F ={CE → D, D→B, C→A}, find the following:
   - All candidate keys?
   - Normal forms the Relation, R satisfies?
   - If not in 3NF, show the process to take it to 3NF?
   - Compute the canonical cover of the given function dep, F.
2. Provided R(A,B,C,D,E,F,G), compute the canonical (minimal) cover of F ={AD → BF, CD→ EGC, BD → F, E → D, F→C, D→F}
3. Suppose you are given a relation R=(A,B,C,D,E) with the following functional dependencies: {BC → ADE,D→B}
   - Find all candidate keys
   - Identify the best normal form the R satisfies.
4. Given, R = {A,B,C,D,E,F,G,H} and F = {AC→G, D→EG, BC→D, CG→BD, ACD→B, CE→AG}.
   - Find the canonical cover of F.