MAR track winner (20 min and 1 hr Categories)

Iterative Join Graph Propagation

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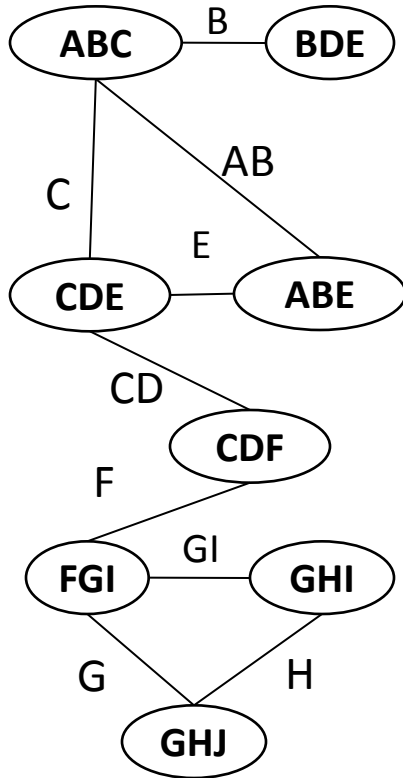
Rina Dechter

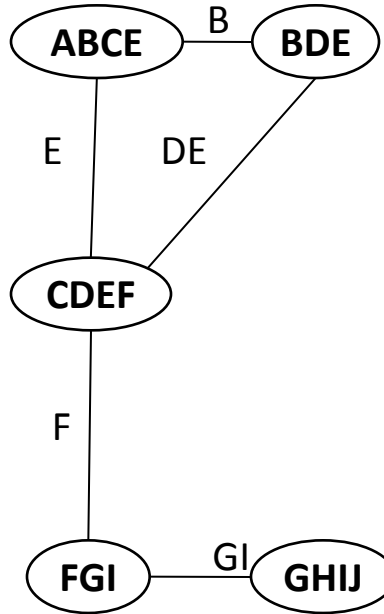University of California, Irvine

With help from Andrew Gelfand, Kalev Kask and Robert Mateescu
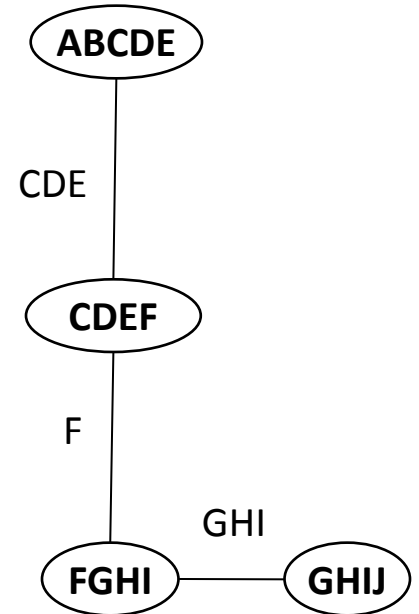**University of California, Irvine**

Join-graphs

i-bound=3

ABC —B— BDE

ABC —AB—
C
CDE —E— ABE

CDE —CD— CDF

CDF —F—
FGI —GI— GHI

FGI —G— GHJ —H— GHI

i-bound=4

ABCE —B— BDE

ABCE —E—
BDE —DE—
CDEF

CDEF —F— FGI —GI— GHIJ

i-bound=5
Junction tree
Join tree

ABCDE —CDE— CDEF —F— FGHI —GHI— GHIJ

more accuracy →

← **less complexity**

IJGP: Implementation highlights

- Run as a anytime scheme
  - Start with i-bound=1
  - after convergence or 10 iterations, increase i-bound and repeat.
- Randomized Orderings (helps a lot. Thanks Andrew)
- SAT based domain pruning
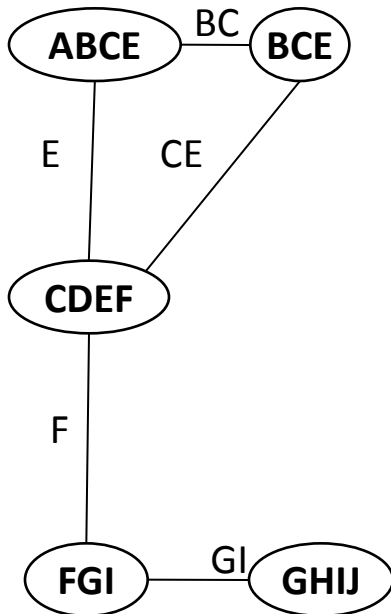 - prune each variable-value combination that is inconsistent i.e. $P(X_i=x_i)=0$.

Memory is a problem, time is not!

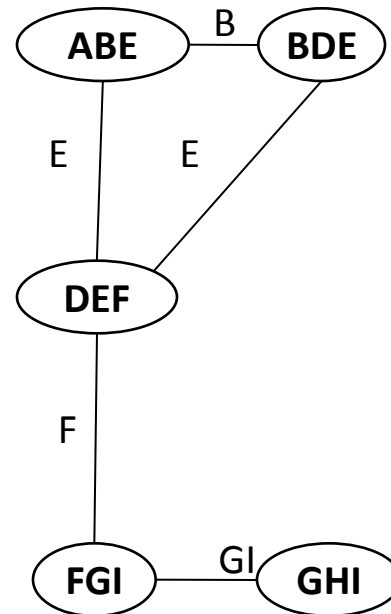- If i-bound does not fit in memory, run cutset-based IJGP.

$$P'(x|e) = \sum_{c \in cutset} P'(x|e,c)P'(c)$$

$P'(x|e)$ is the current approximation of $P(x|e)$

Can't fit this in memory

Remove C and J

IJGP: References

1. **Robert Mateescu, Kalev Kask, Vibhav Gogate and Rina Dechter (2010) "Join-Graph Propagation Algorithms", Journal of Artificial Intelligence Research (JAIR), Volume 37, pages 279-328.**

2. **Rina Dechter, Kalev Kask and Robert Mateescu (2002), "Iterative Join Graph propagation", UAI, pages 128-136.**