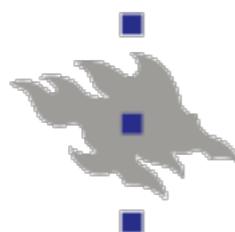


Towards Finding Relational Redescriptions

Esther Galbrun & Angelika Kimmig

ILP 2012

[paper to appear at Discovery Science 2012]



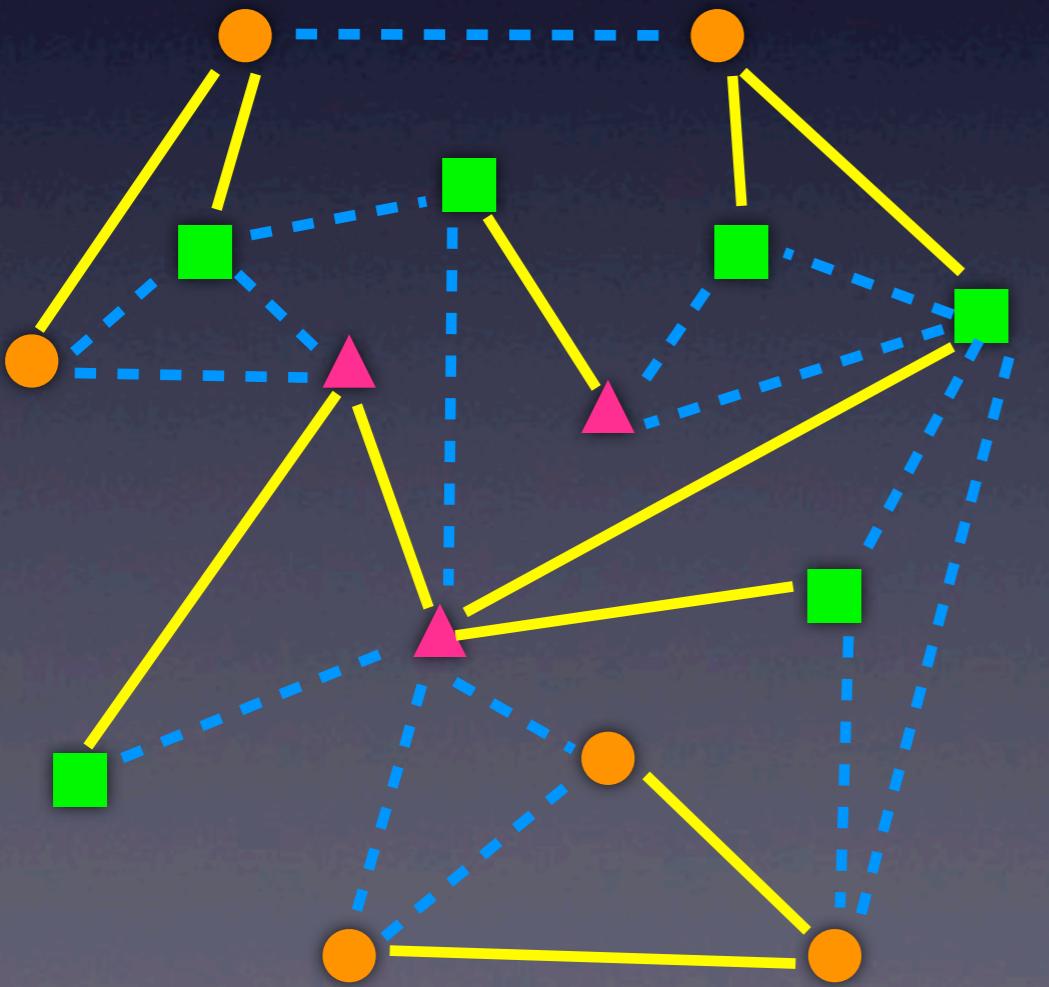
UNIVERSITY OF HELSINKI



UNIVERSITY OF
MARYLAND

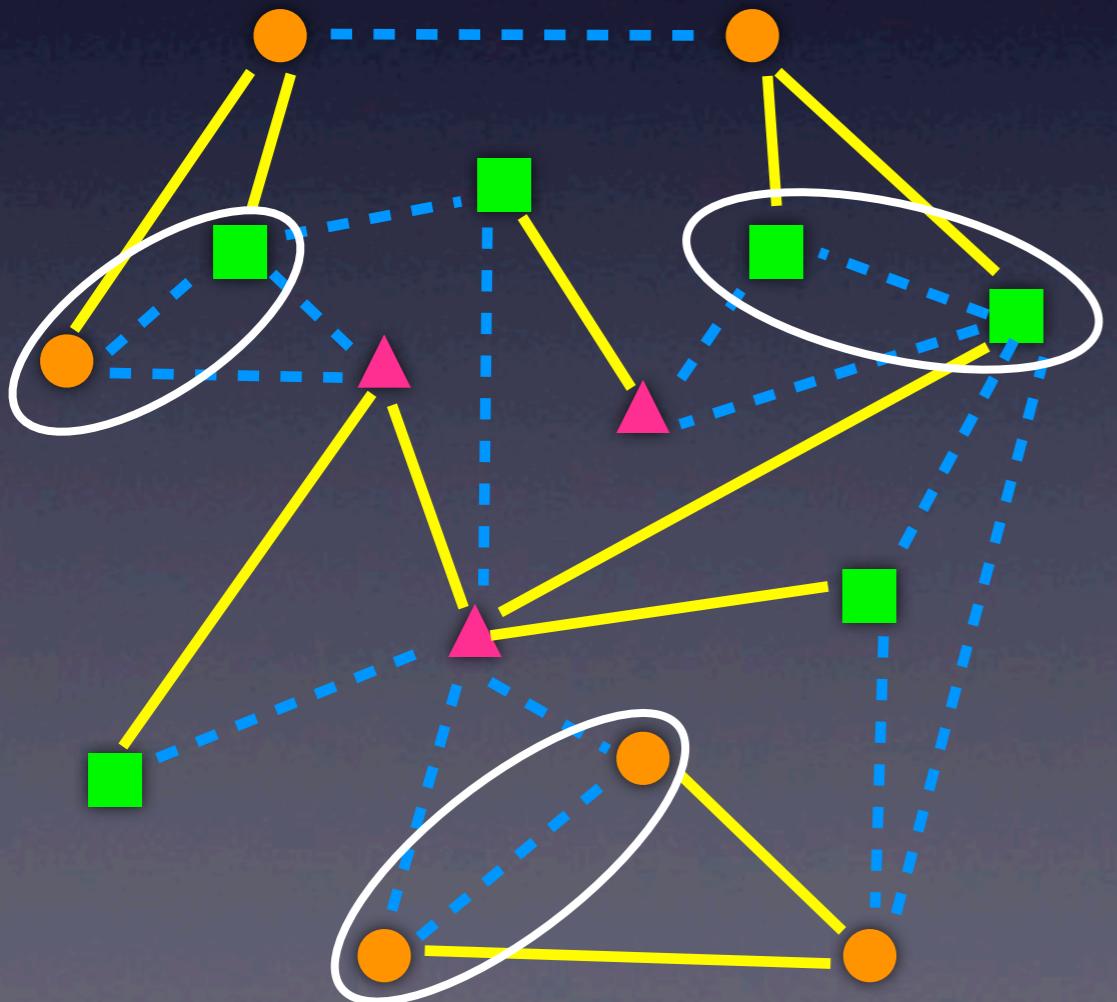
Relational Redescription Mining (RRM)

Given: data network

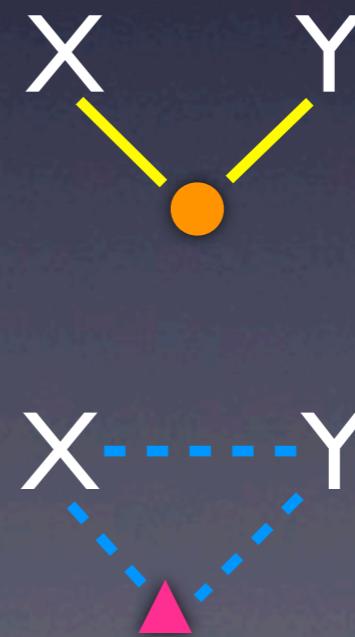


Relational Redescription Mining (RRM)

Given: data network

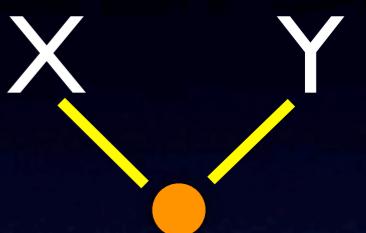


Find: structurally different patterns covering (nearly) same set of node tuples

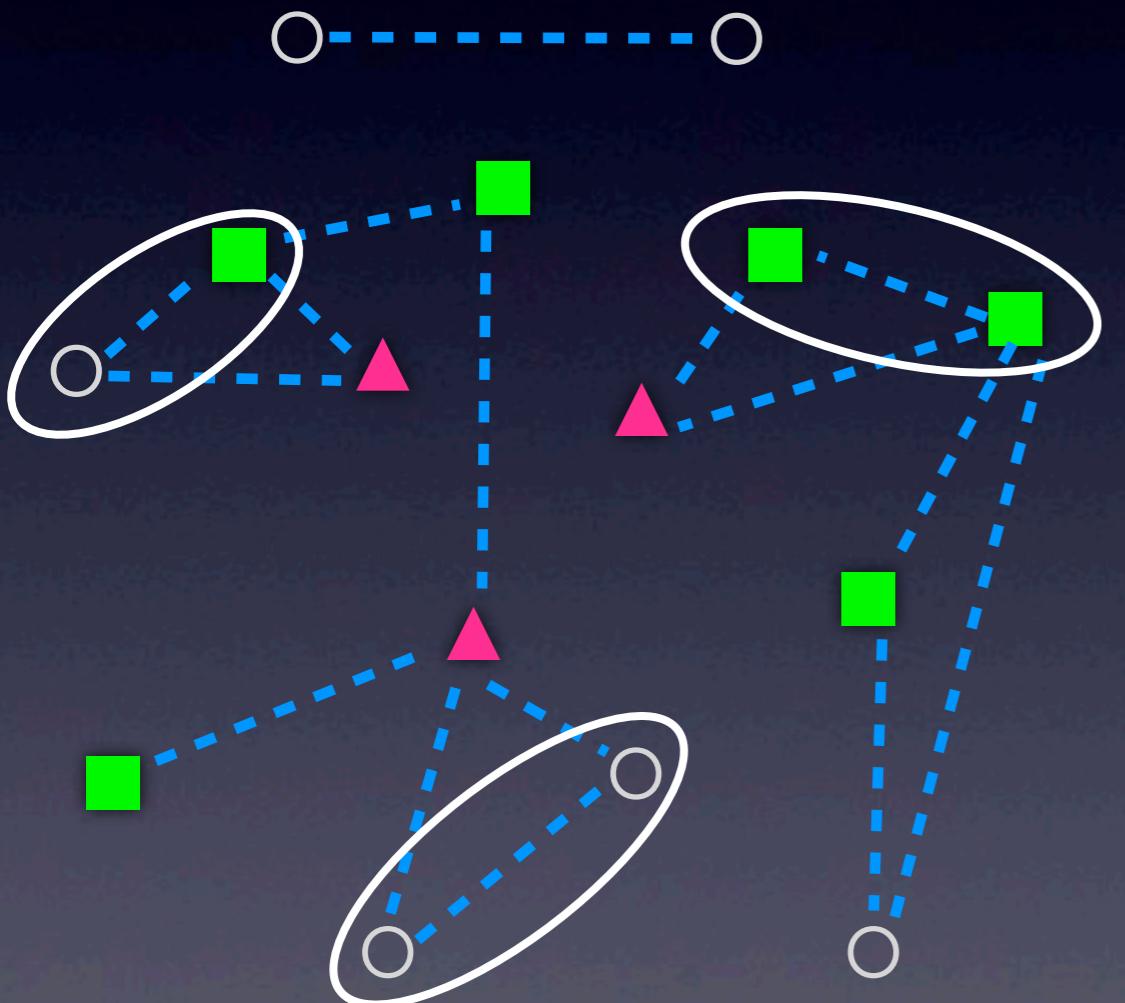


RRM Alternating Scheme

- I. Fix first pattern to create examples



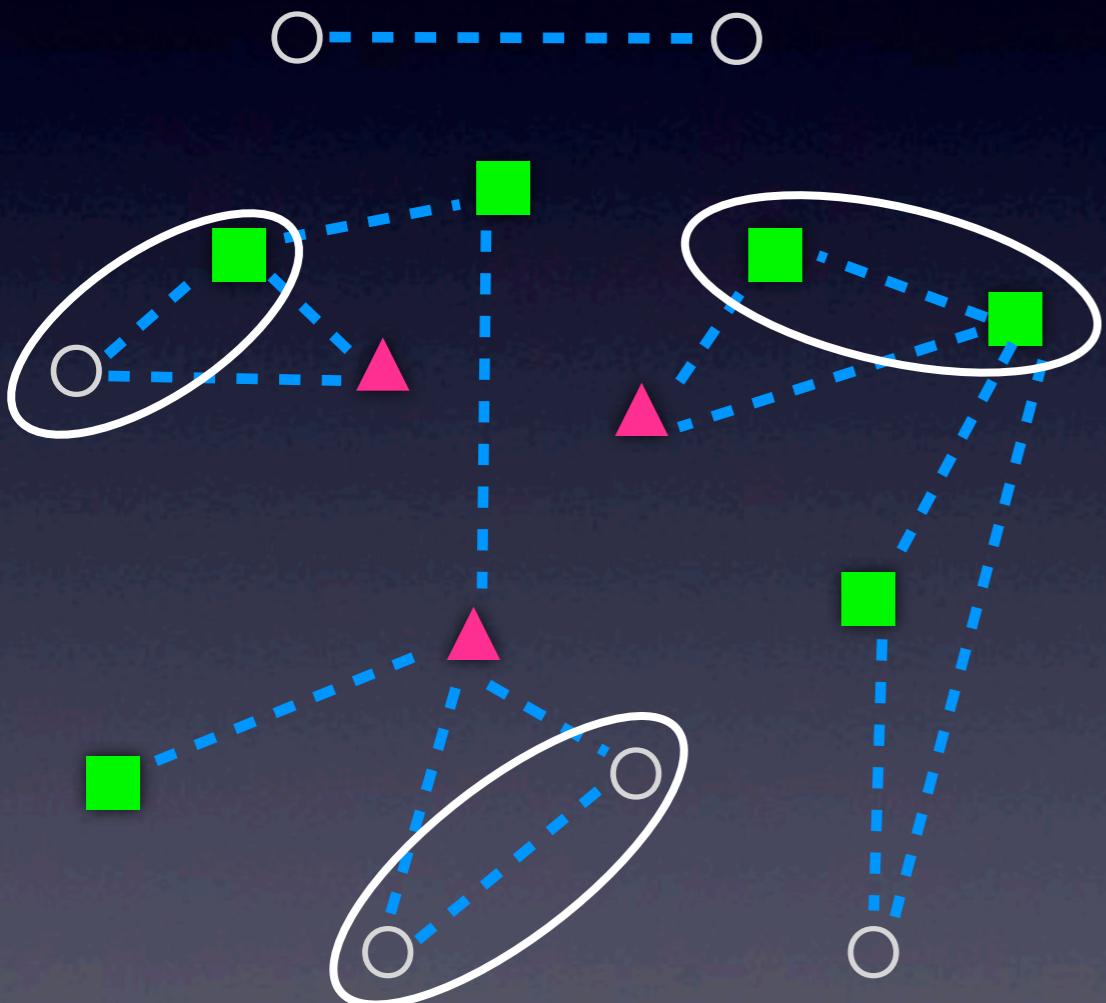
RRM Alternating Scheme



- I. Fix first pattern to create examples
2. Consider predicates not used by first pattern



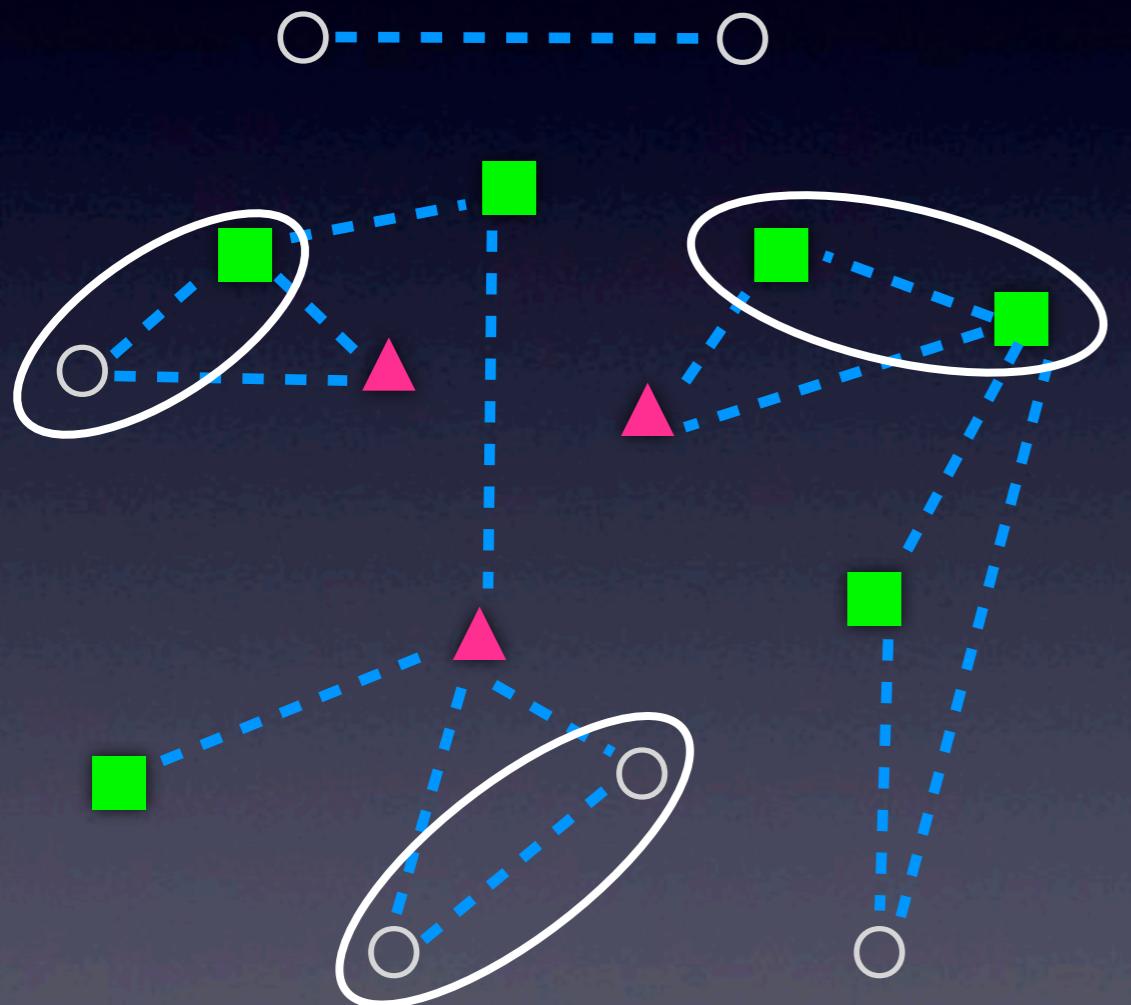
RRM Alternating Scheme



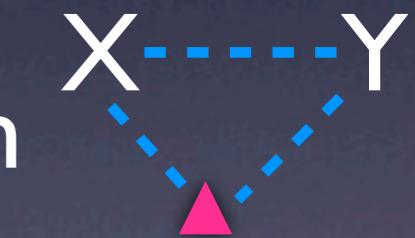
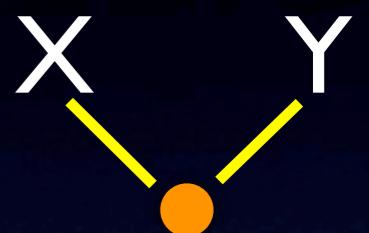
1. Fix first pattern to create examples
2. Consider predicates not used by first pattern
3. Find second pattern



RRM Alternating Scheme

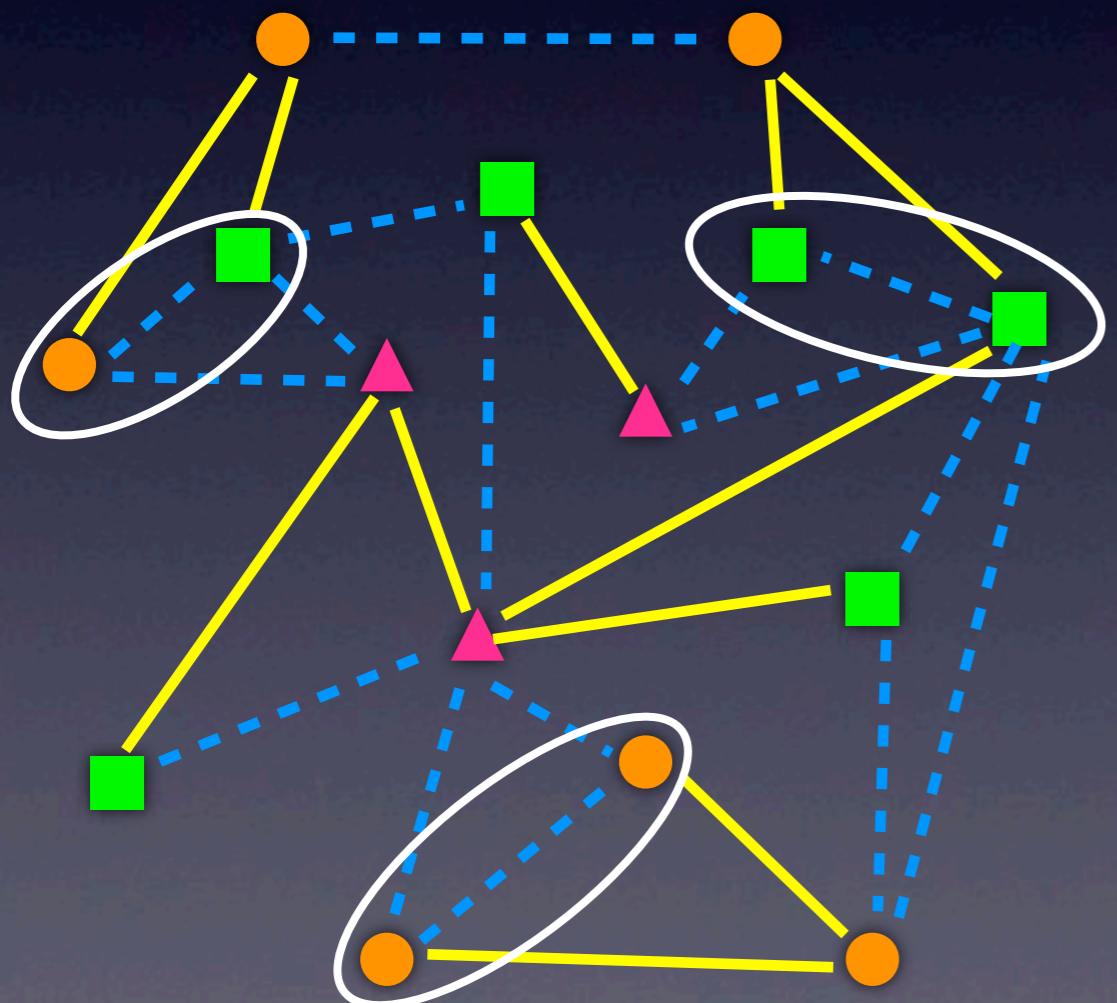


1. Fix first pattern to create examples
2. Consider predicates not used by first pattern
3. Find second pattern
4. Swap roles and iterate



First Step Towards RRM

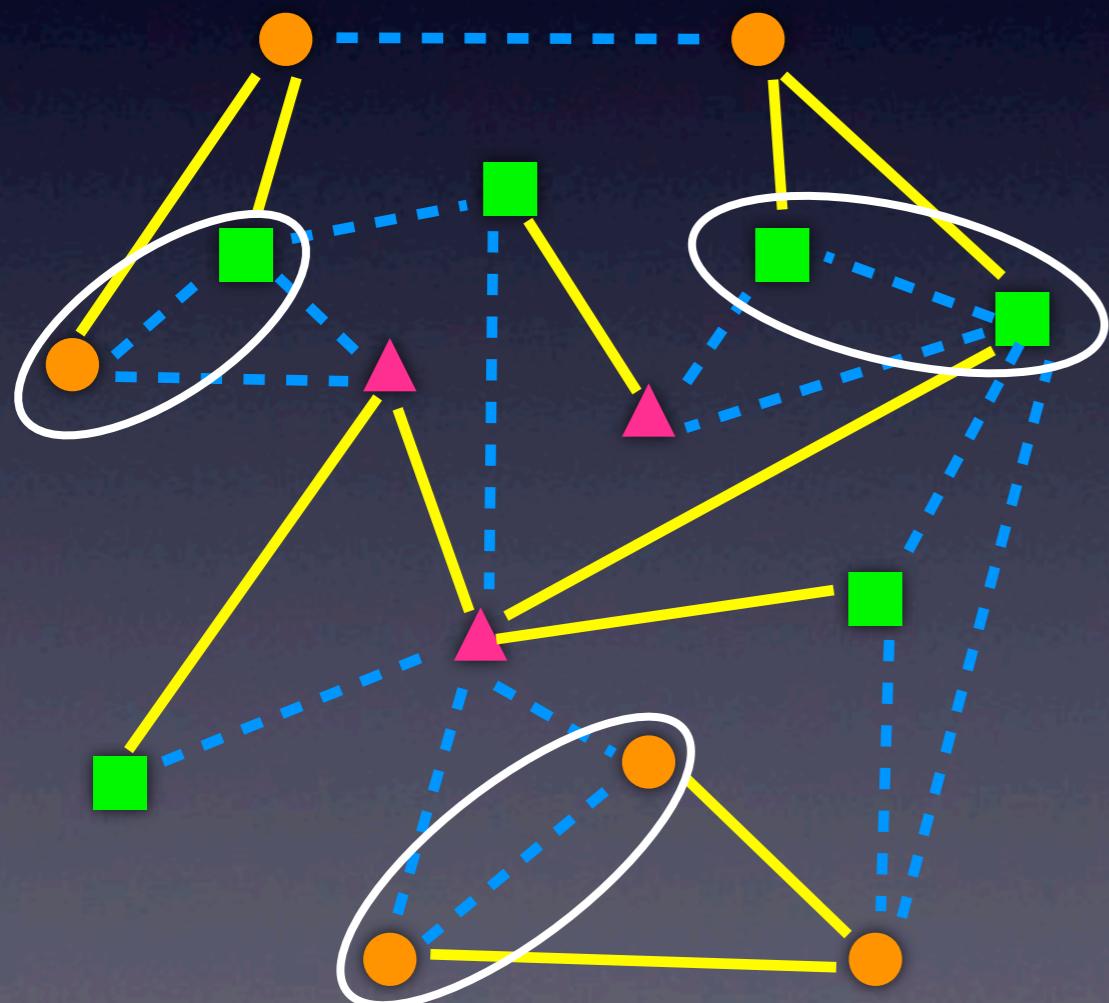
Given: data network &
set of node pairs



First Step Towards RRM

Given: data network &
set of node pairs

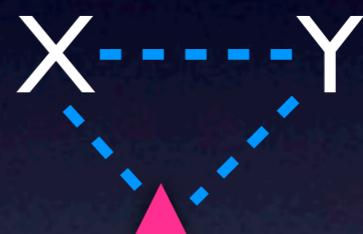
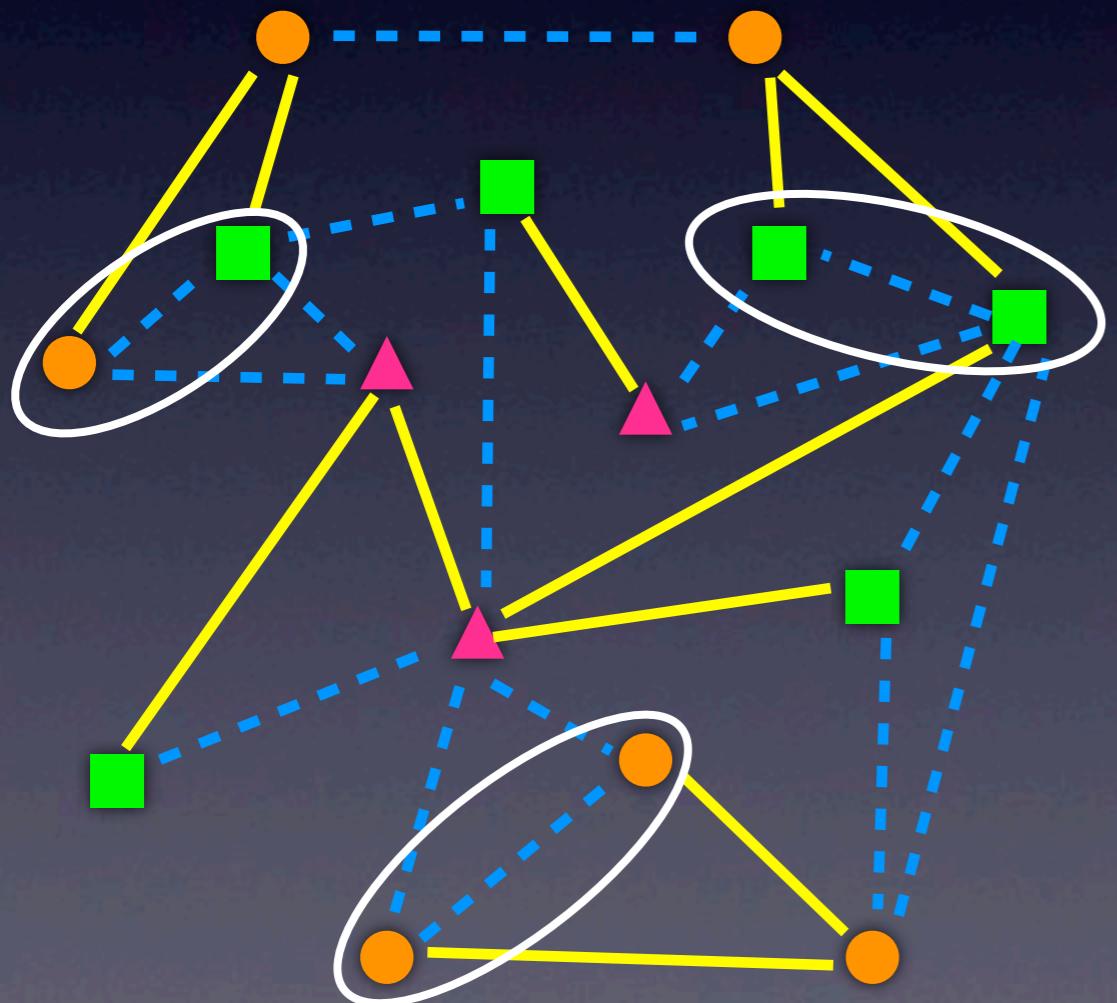
Find: set of patterns
connecting examples



First Step Towards RRM

Given: data network &
set of node pairs

Find: set of patterns
connecting examples



Challenges:

- connected patterns
- complex patterns
- fast mining

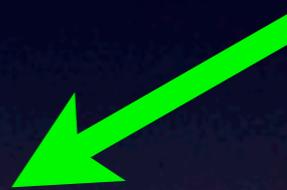
Our Approach

1. Extract path descriptions
2. Mine frequent path patterns
3. Build graph patterns from path patterns
4. Select set of graph patterns

Our Approach

- I. Extract path descriptions
- II. Mine frequent path patterns
- III. Build graph patterns from path patterns
- IV. Select set of graph patterns

constraint-based
pattern mining with
FIM_CP



Our Approach

- I. Extract path descriptions

constraint-based
pattern mining with
FIM_CP

2. Mine frequent path patterns

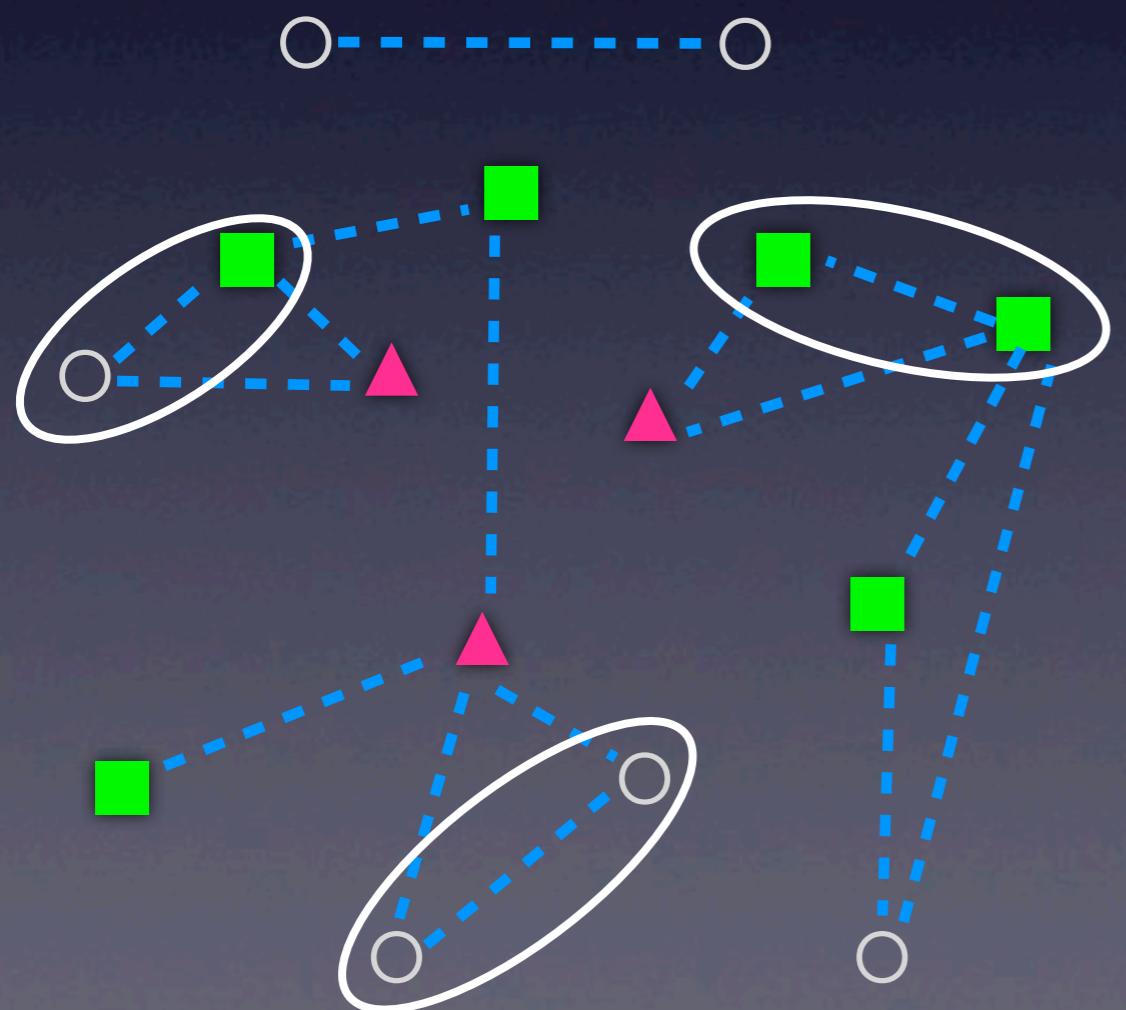
3. Build graph patterns from path patterns

4. Select set of graph patterns

interleaved

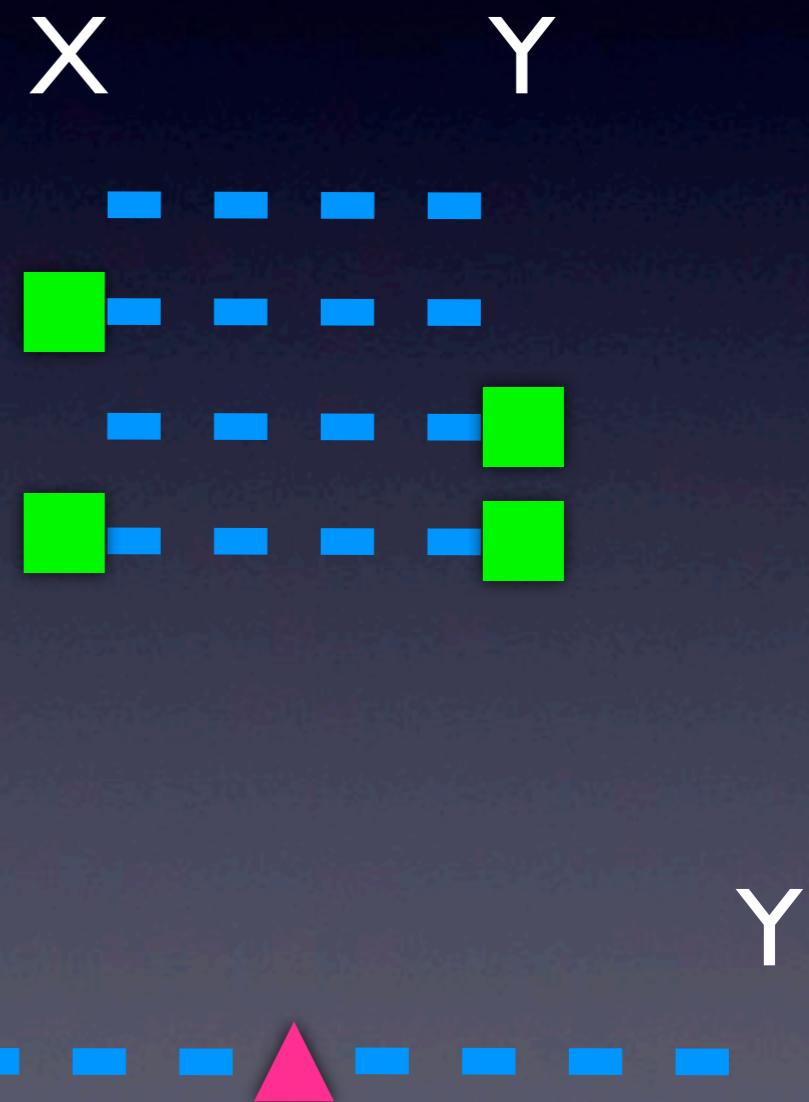
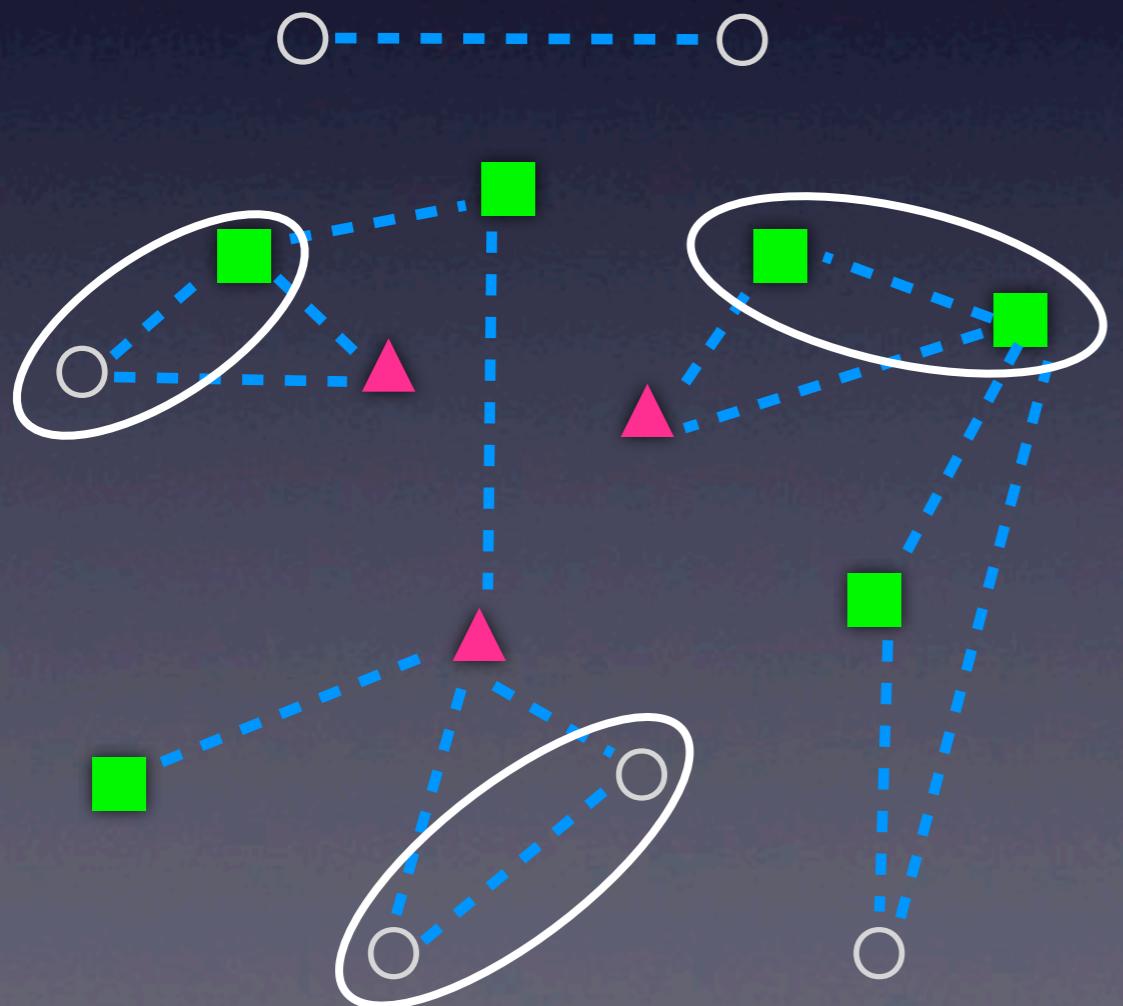
I. Extract path descriptions

- edge types
- node attributes
- node attribute comparisons

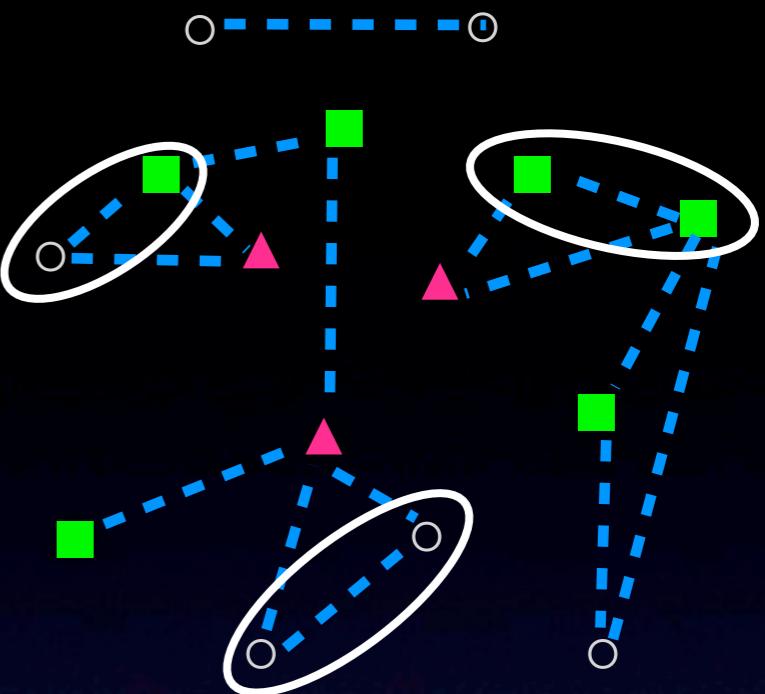


I. Extract path descriptions

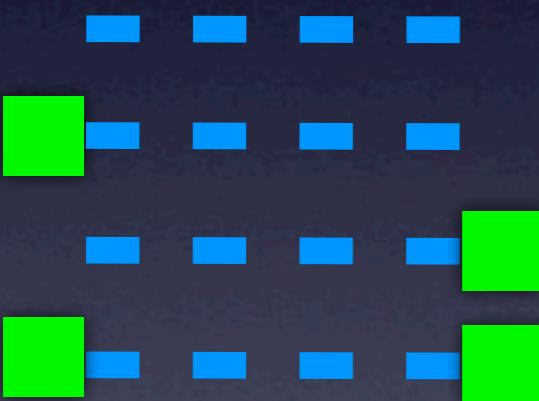
- edge types
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2. Mine frequent paths

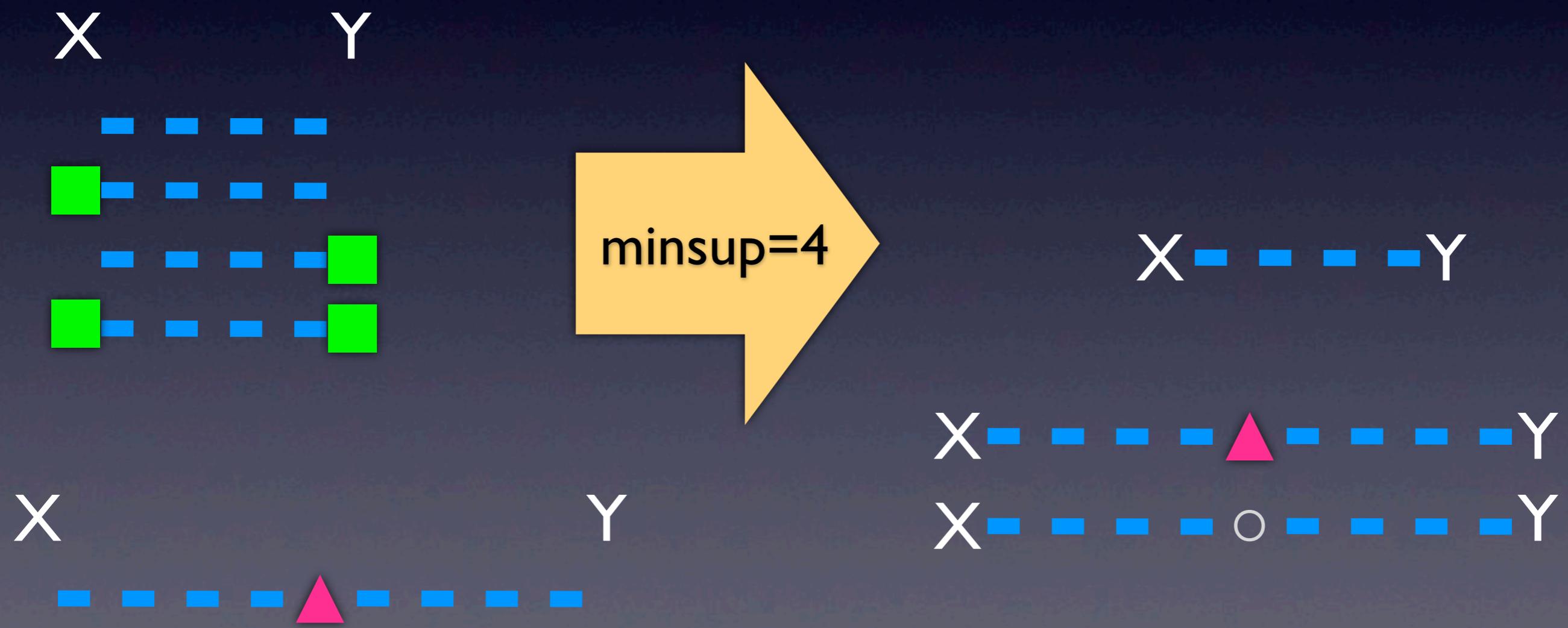


X Y



The diagram consists of a horizontal row of nine blue squares. In the center of this row is a single pink triangle pointing upwards. On the far left side of the row, there is a large white letter 'X'. On the far right side, there is a large white letter 'Y'.

2. Mine frequent paths

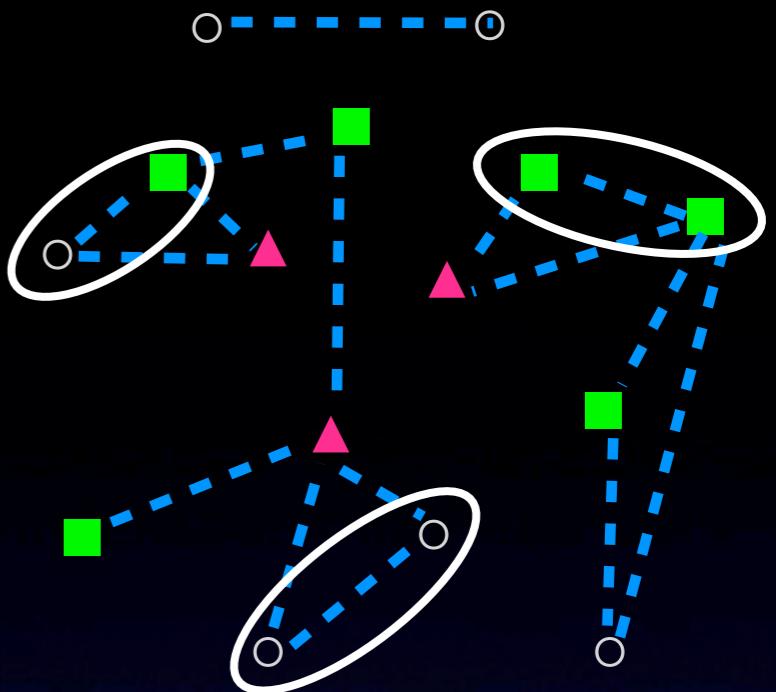


3. Build graphs

X - - - Y

X - - - O - - - Y

X - - - ▲ - - - Y



3. Build graphs

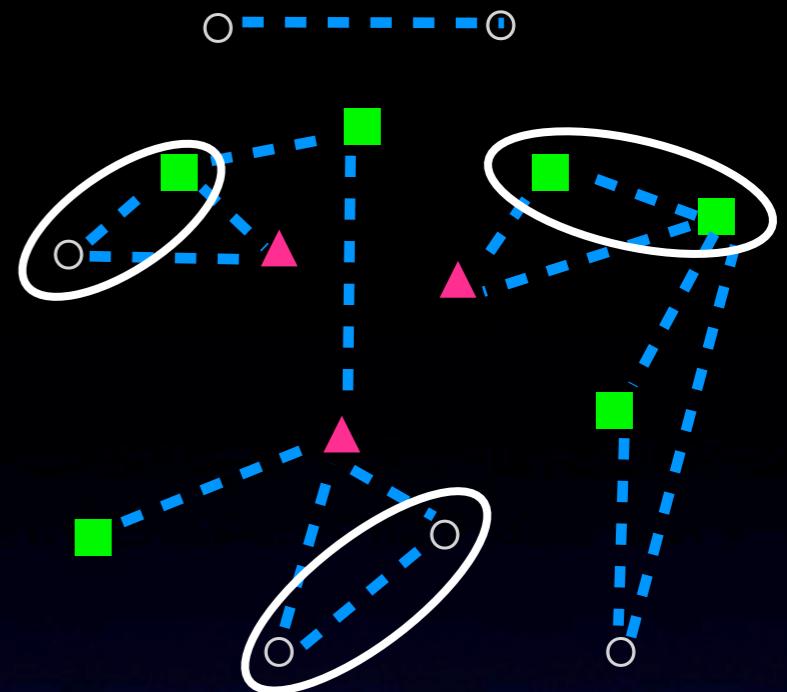
X - - - Y

X - - - O - - - Y

X - - - ▲ - - - Y

X - - - Y
 \ /
 O

X - - - Y
 / \
 ▲



4. Select graphs

X-----Y 6 / 32

covered
examples

X-----○-----Y

6 / 48 covered
pairs

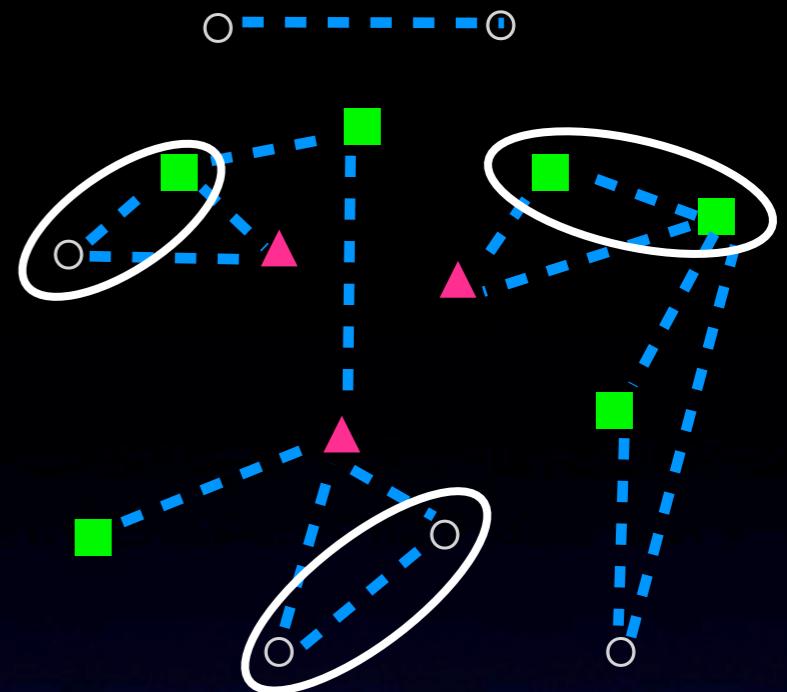
X-----▲-----Y 6 / 16



6 / 24



6 / 6



4. Select graphs

X - - - - Y 6 / 32

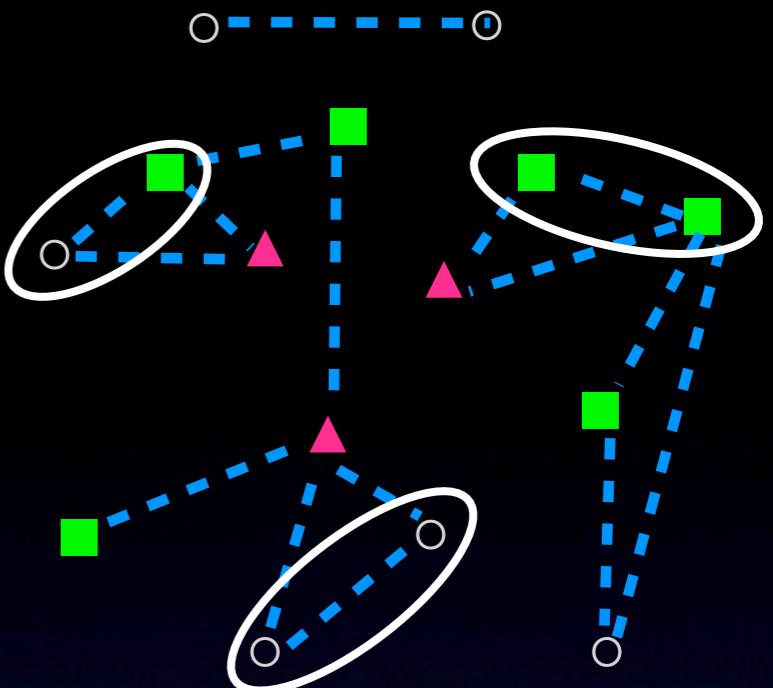
X - - - - ▲ - - - Y 6 / 16

A diagram illustrating a path from point X to point Y. The path consists of several blue dashed segments. It starts at point X (top left), moves right to a vertical segment, then down to another vertical segment. From there, it turns right again to a horizontal segment, which then splits into two diagonal segments pointing towards a central white circle. From this central circle, the path continues with a horizontal segment to the right, followed by a vertical segment upwards, and finally a horizontal segment to point Y (top right). The background is dark gray.

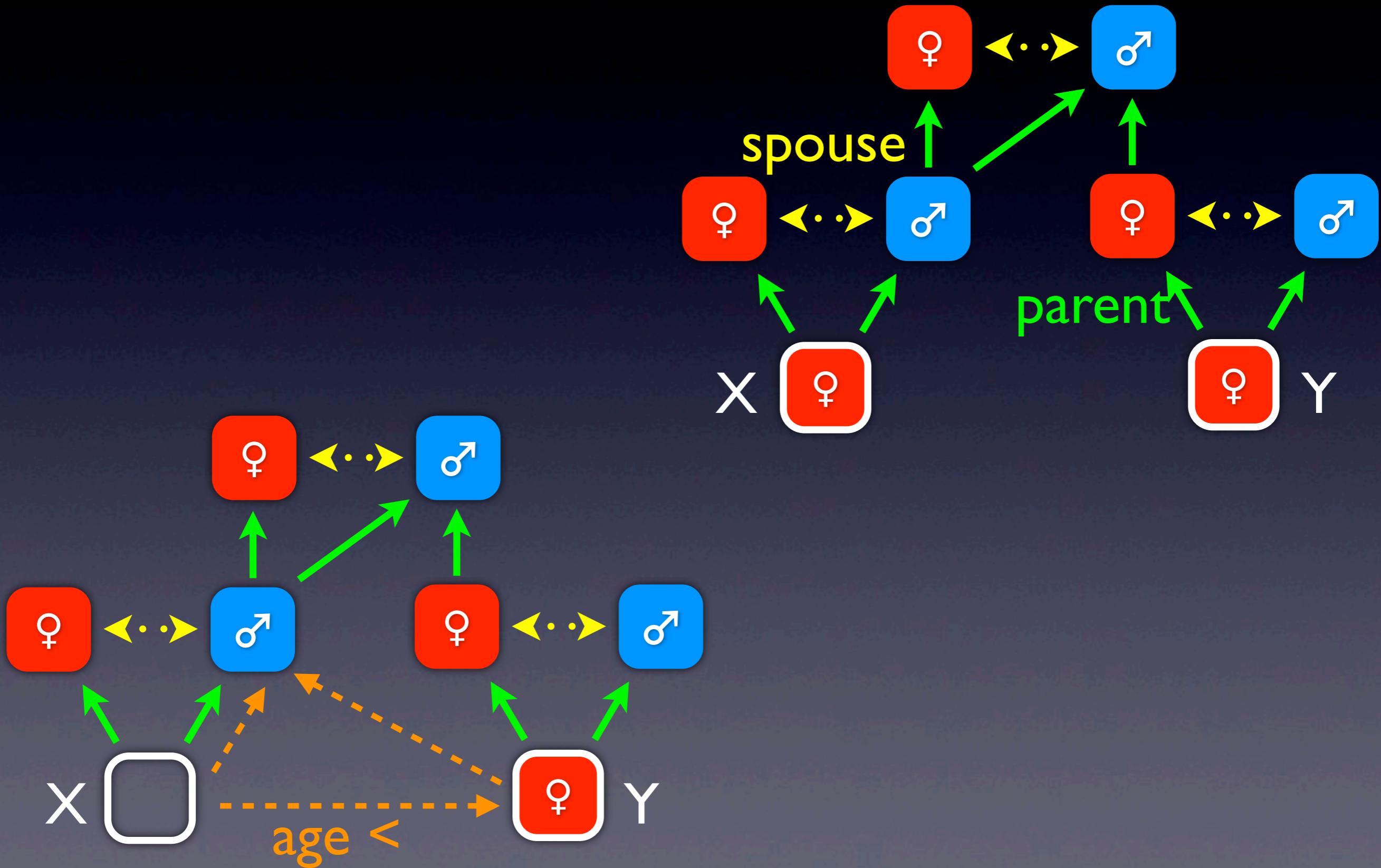
The diagram illustrates a path from point X on the left to point Y on the right. The path consists of several blue dashed segments forming a zigzag pattern. A large pink triangle is positioned at the center of the path. In the bottom right corner, there is a white text overlay that reads "6 / 6".

covered examples

6 / 48 ← covered pairs

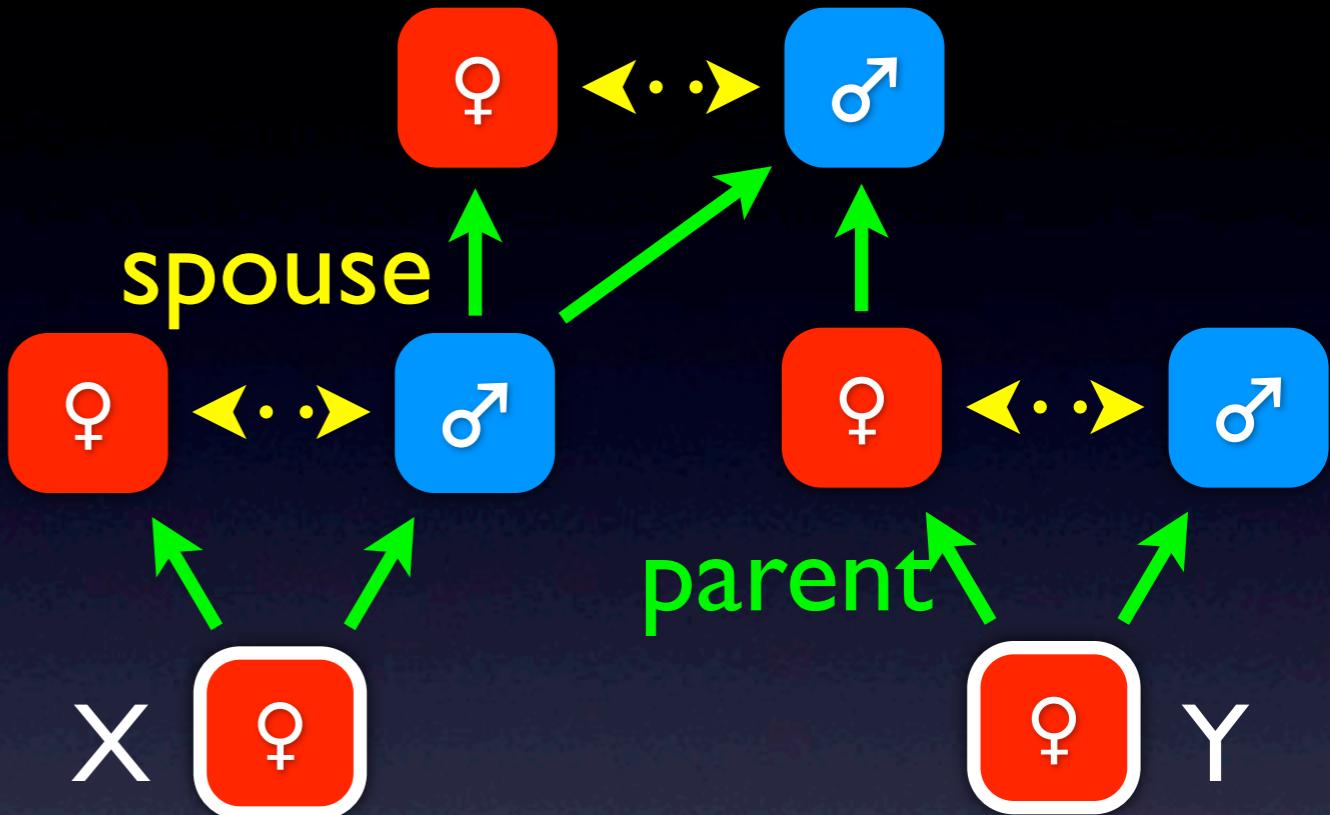
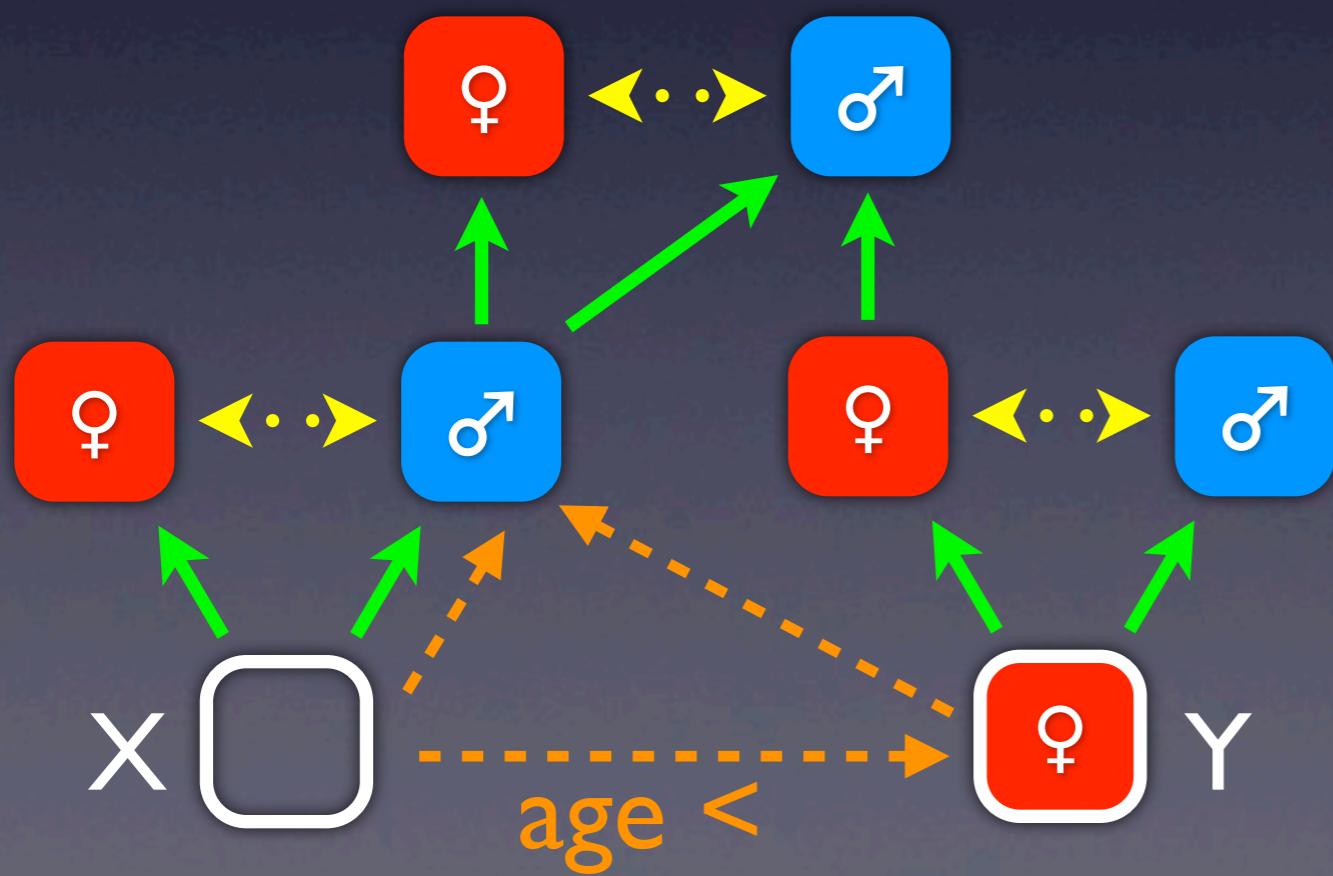


Experiment: Kinship Terms



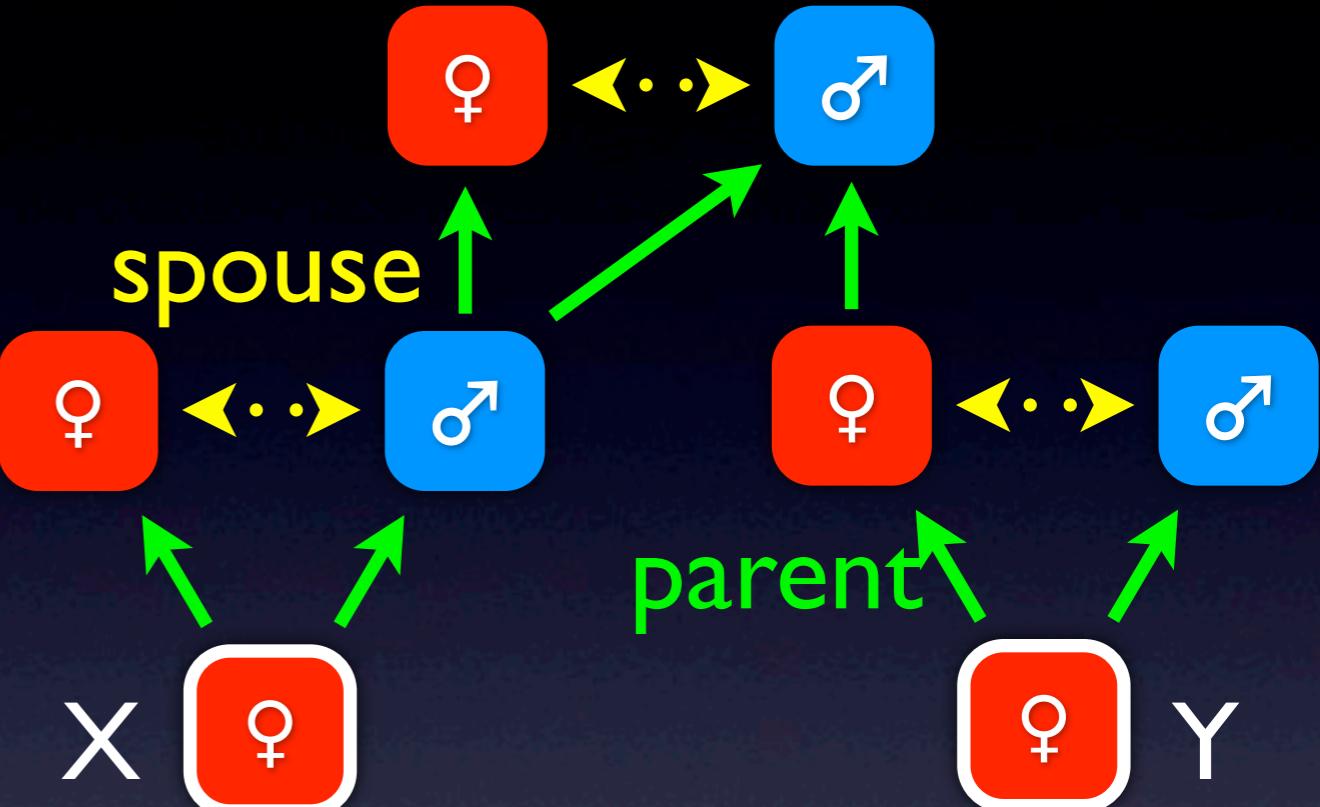
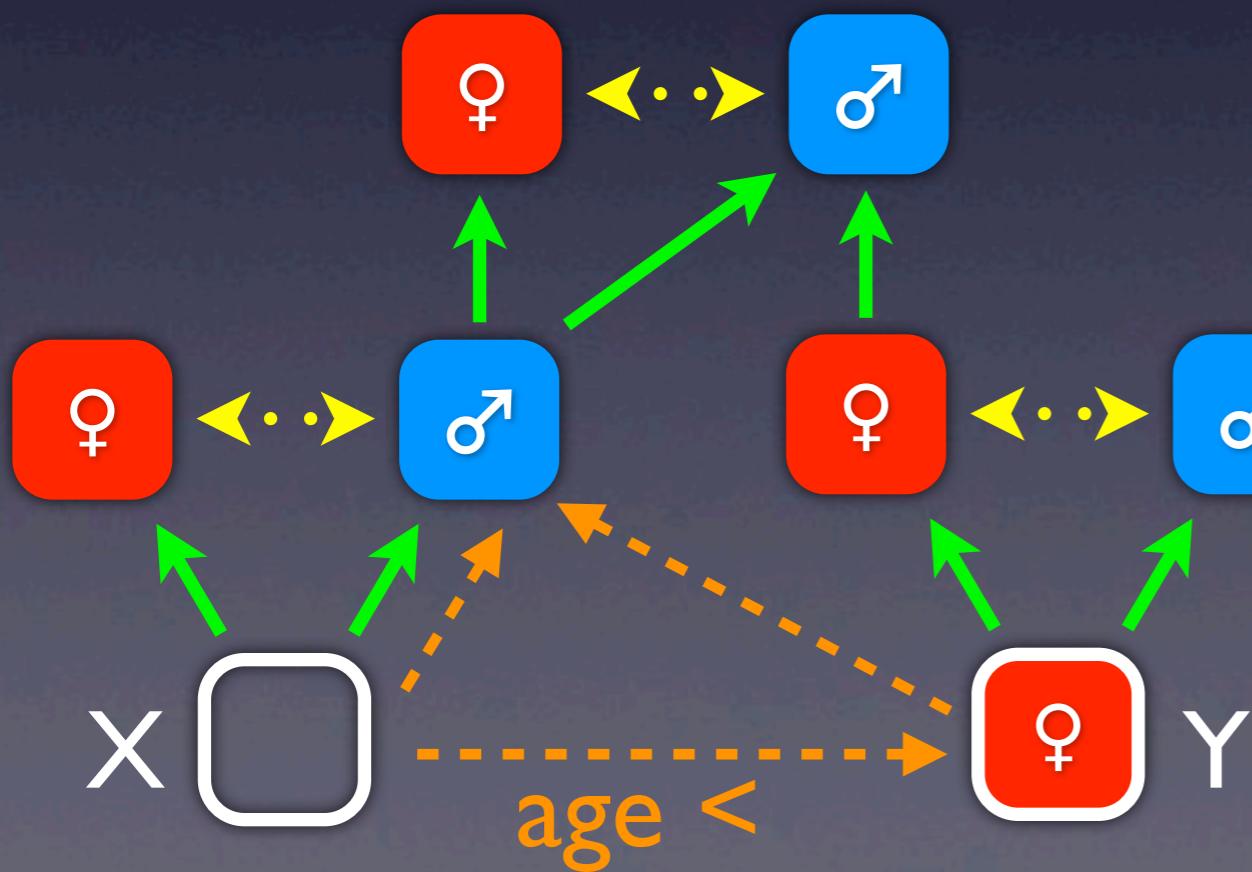
Experiment: Kinship Terms

Algyeliya = “my father’s sister’s daughter” or
“my mother’s brother’s daughter”



Experiment: Kinship Terms

Algyeliya = “my father’s sister’s daughter” or “my mother’s brother’s daughter”



Challenges:

- connected patterns
- complex patterns
- fast mining

Conclusions

- **Relational redescriptions:** structurally different relational patterns covering same tuples
- **First step:** find disjunctive patterns covering given example pairs
- **Our approach:** constructing patterns from frequent paths
- **Experiments:** approach finds more complex patterns faster than direct relational approach

Thank you!