

# Knowledge Graph Construction from Text

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AAAI 2017

JAY PUJARA, SAMEER SINGH, BHAVANA DALVI

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# Introducing Presenters

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Jay Pujara: Postdoc at UC Santa Cruz



Sameer Singh: Assistant Professor at UCI



Bhavana Dalvi: Research Scientist at AI2

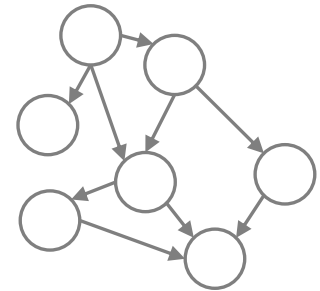
# Tutorial Overview

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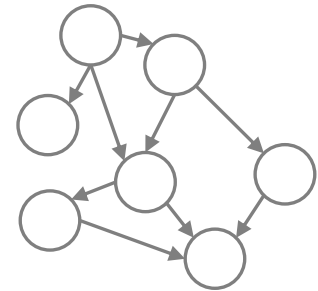
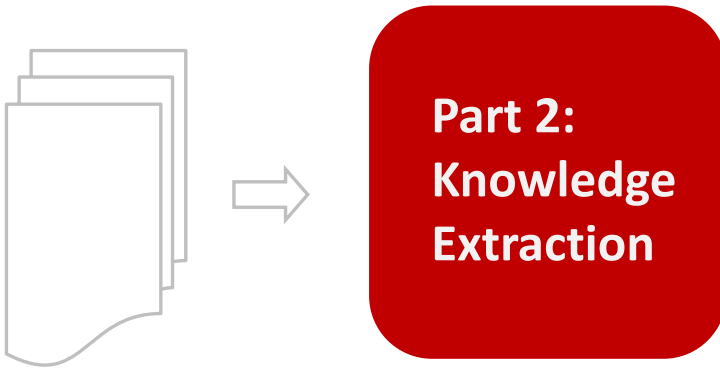
## Part 1: Knowledge Graphs



# Tutorial Overview

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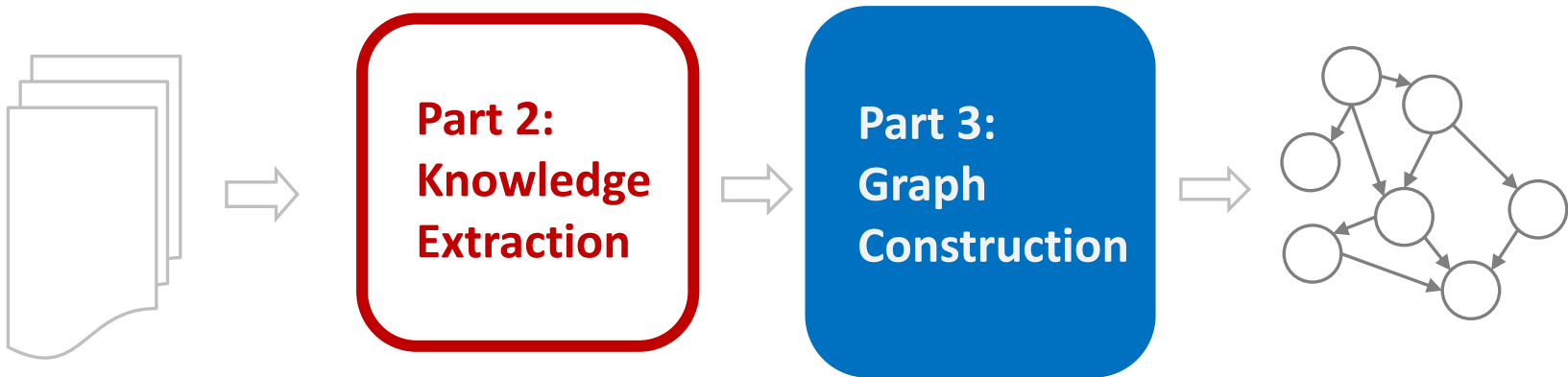
## Part 1: Knowledge Graphs



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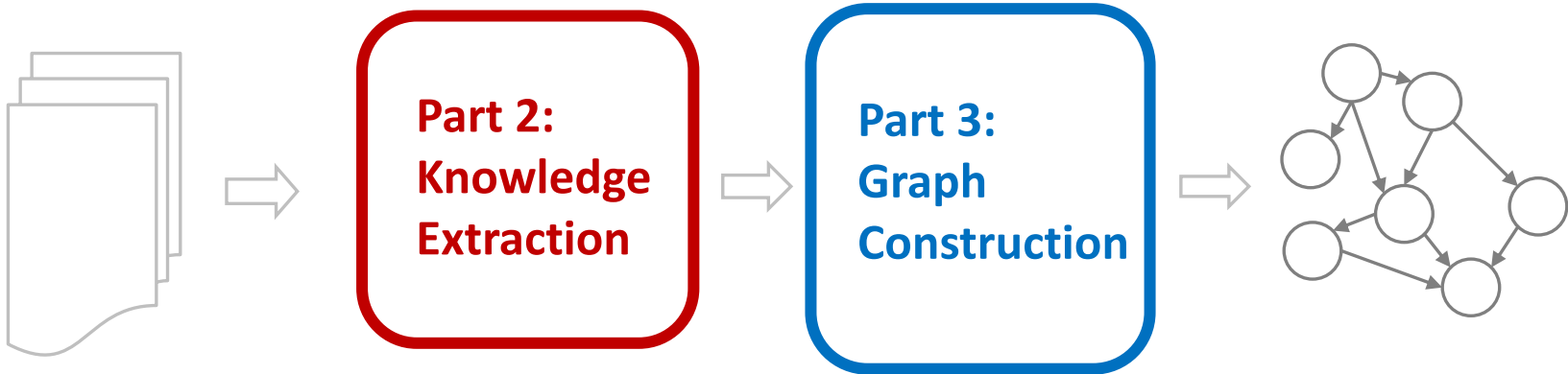
## Part 1: Knowledge Graphs



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**Part 1: Knowledge Graphs**

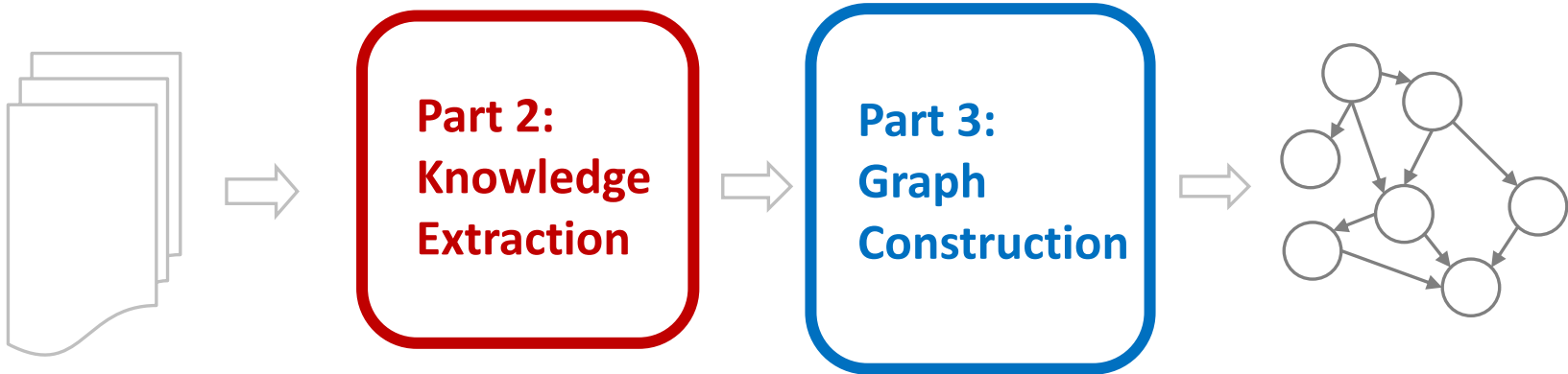


**Part 4: Critical Analysis**

# Tutorial Overview

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**Part 1: Knowledge Graphs**



**Part 4: Critical Analysis**



# Tutorial Outline

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## 1. Knowledge Graph Primer

[Jay]



## 2. Knowledge Extraction from Text

a. NLP Fundamentals

[Sameer]



b. Information Extraction

[Bhavana]



## Coffee Break



## 3. Knowledge Graph Construction

a. Probabilistic Models

[Jay]



b. Embedding Techniques

[Sameer]



## 4. Critical Overview and Conclusion

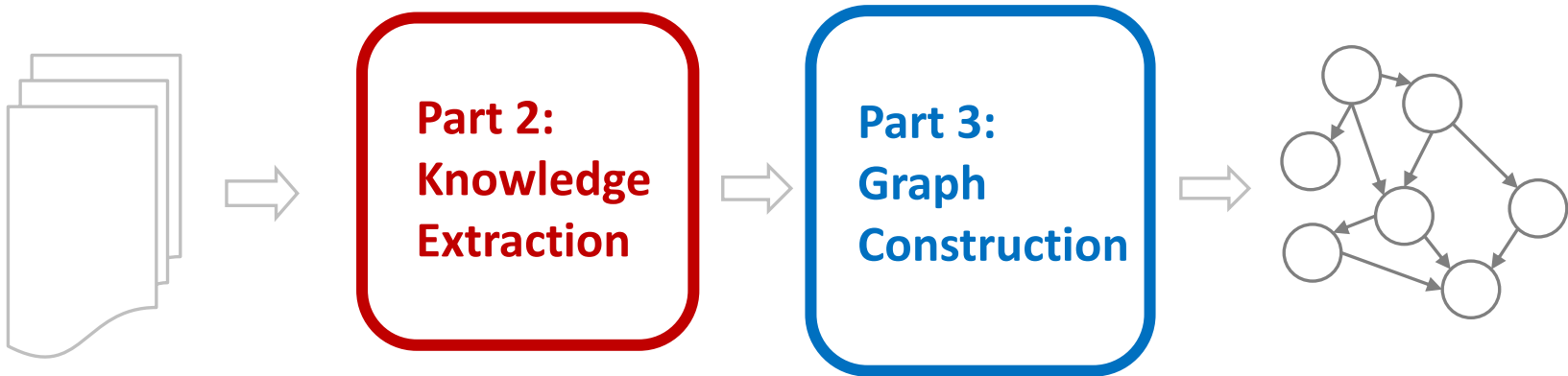
[Bhavana]



# Tutorial Overview

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## Part 1: Knowledge Graphs



## Part 4: Critical Analysis

# Knowledge Graph Primer

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## TOPICS:

WHAT IS A KNOWLEDGE GRAPH?

WHY ARE KNOWLEDGE GRAPHS IMPORTANT?

WHERE DO KNOWLEDGE GRAPHS COME FROM?

KNOWLEDGE REPRESENTATION CHOICES

PROBLEM OVERVIEW

# Knowledge Graph Primer

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# What is a knowledge graph?

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- Knowledge in graph form!

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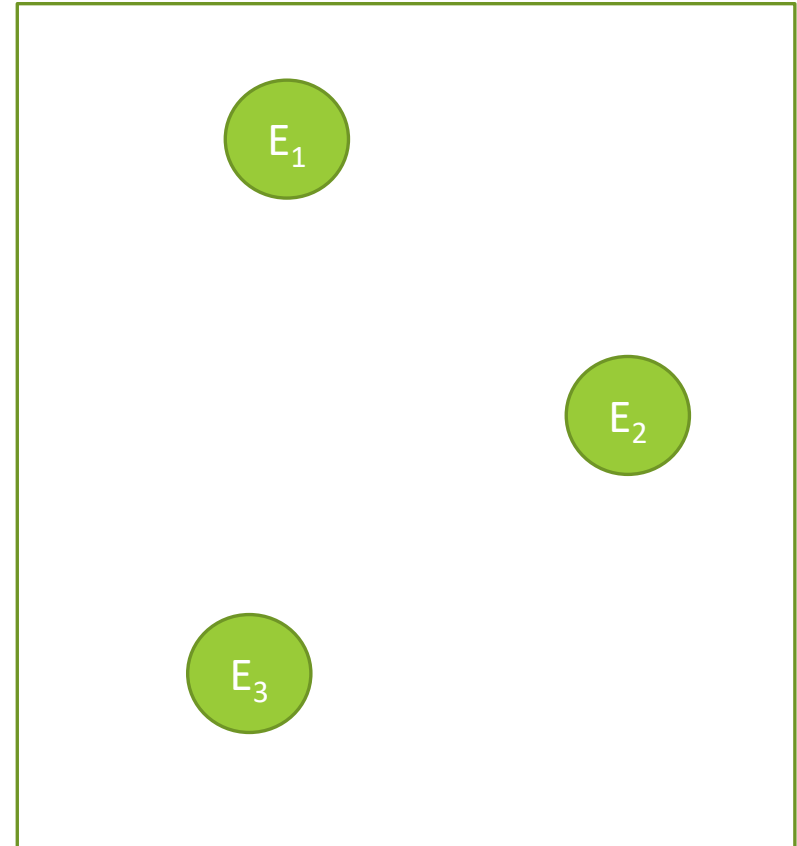
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- Knowledge in graph form!
- Captures entities, attributes, and relationships

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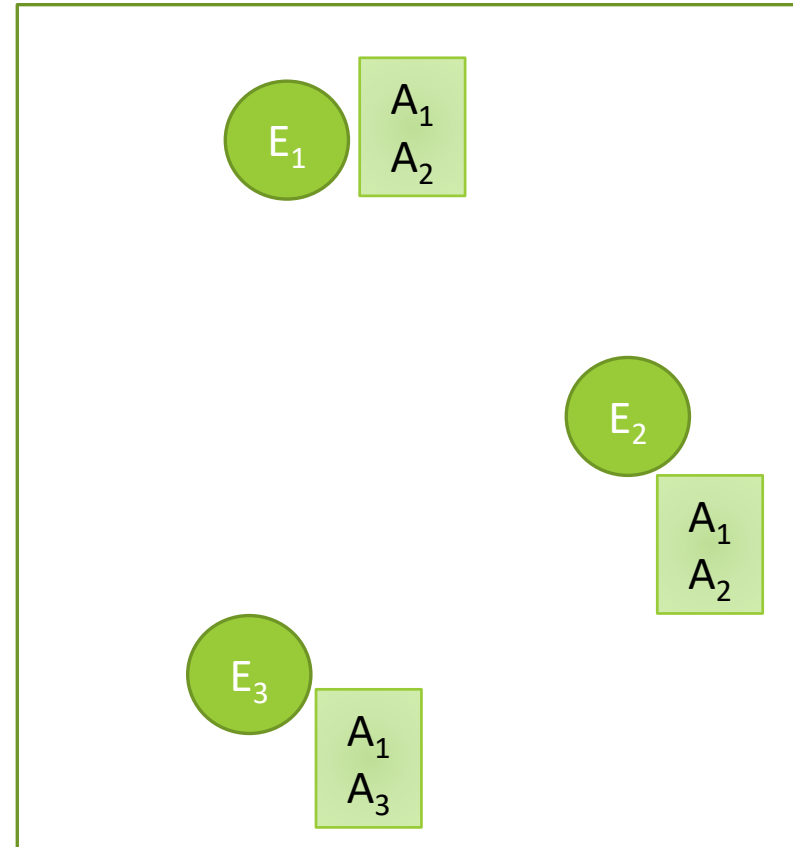
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- Knowledge in graph form!
- Captures entities, attributes, and relationships
- Nodes are entities



# What is a knowledge graph?

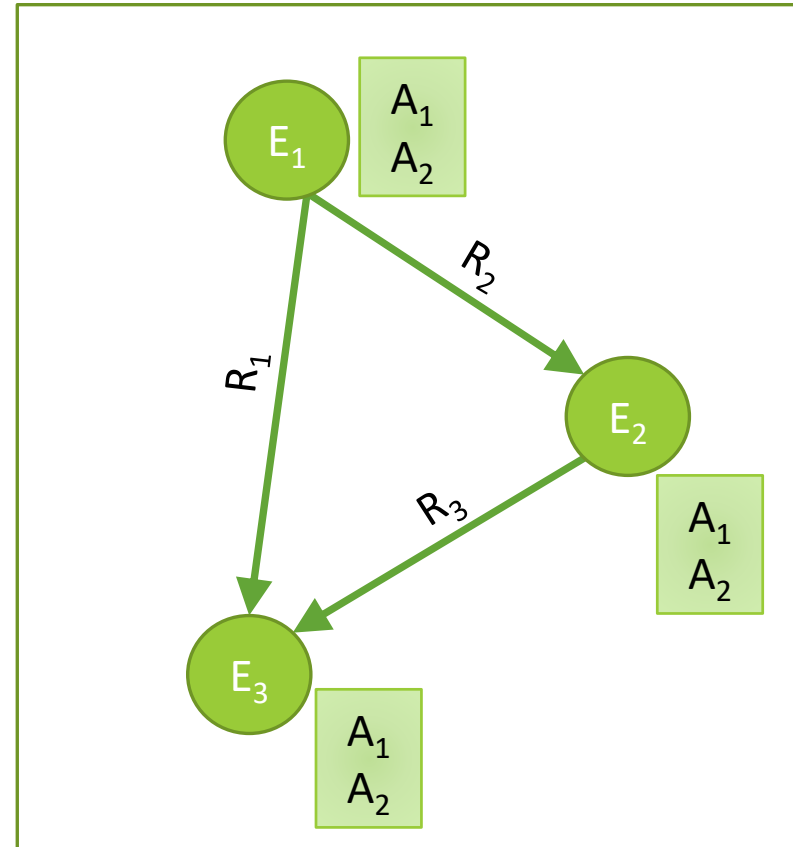
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- Nodes are labeled with attributes (e.g., types)





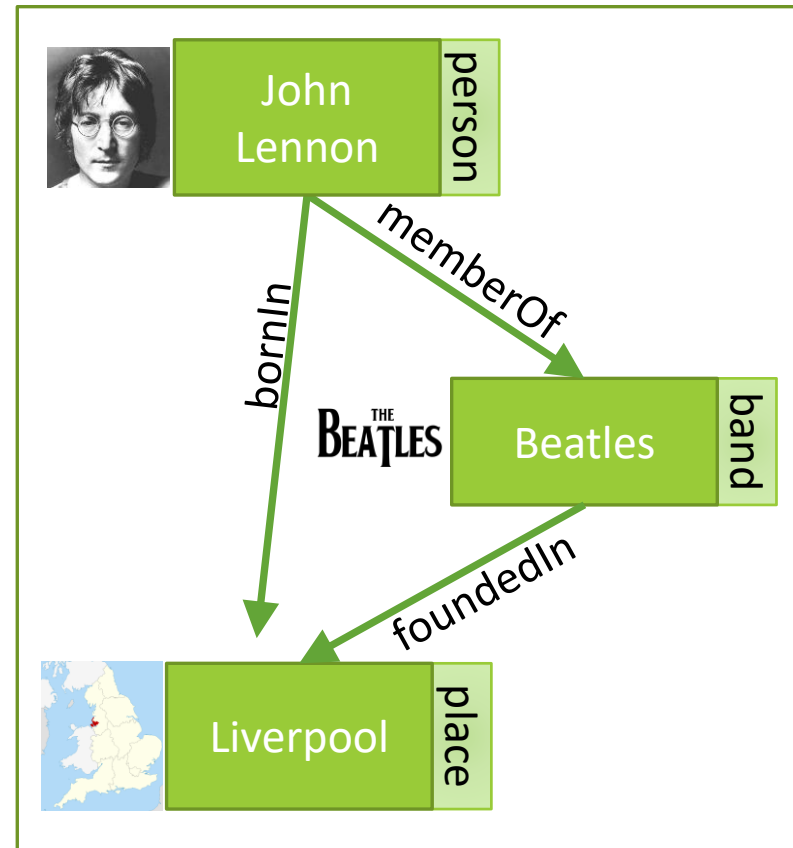
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- Knowledge in graph form!
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- Typed edges between two nodes capture a relationship between entities



# Example knowledge graph

- Knowledge in graph form!
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# Knowledge Graph Primer

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# Why knowledge graphs?

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- Humans:
  - Combat information overload
  - Explore via intuitive structure
  - Tool for supporting knowledge-driven tasks
- AIs:
  - Key ingredient for many AI tasks
  - Bridge from data to human semantics
  - Use decades of work on graph analysis

# Knowledge Graph Primer

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PROBLEM OVERVIEW

# Where do knowledge graphs come from?

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- Structured Text
  - Wikipedia Infoboxes, tables, databases, social nets

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  - Wikipedia Infoboxes, tables, databases, social nets
- Unstructured Text
  - WWW, news, social media, reference articles
- Images
- Video
  - YouTube, video feeds

# Knowledge Graph Primer

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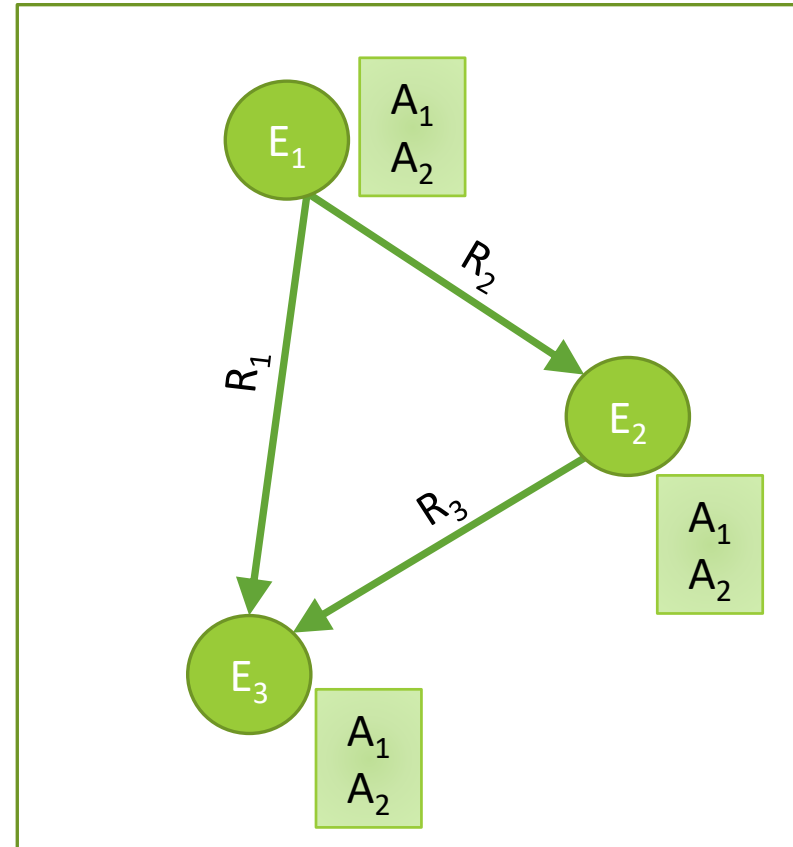
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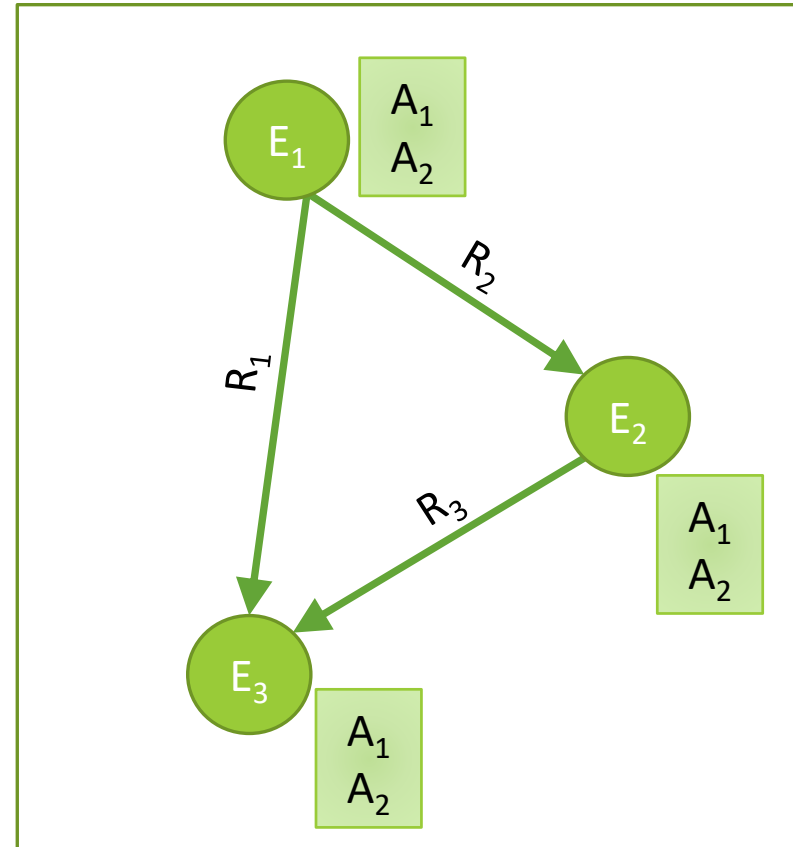
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# Basic problems

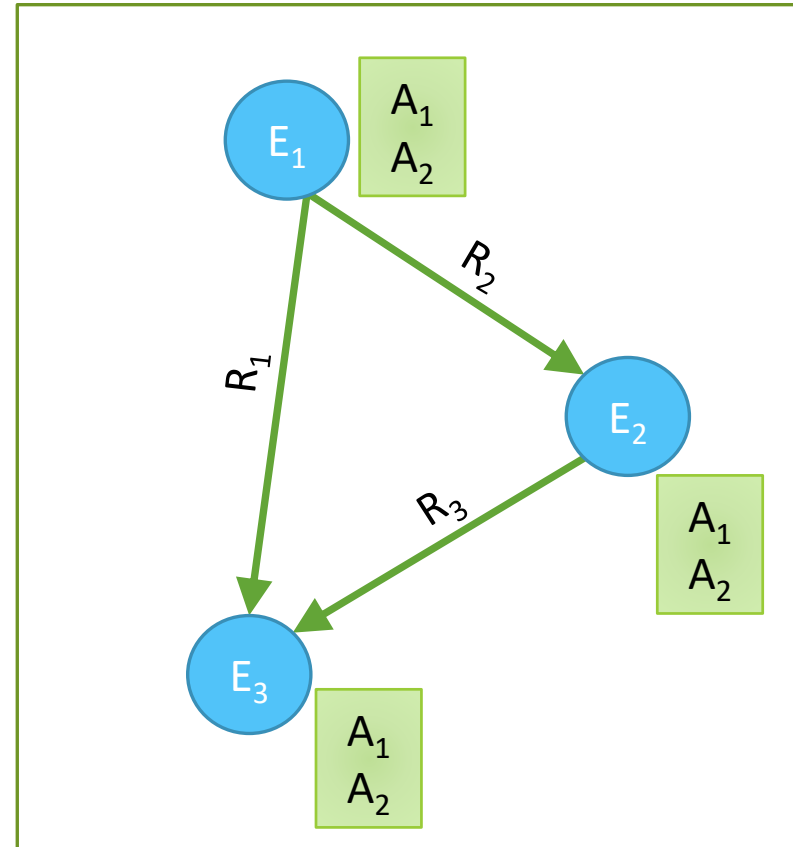
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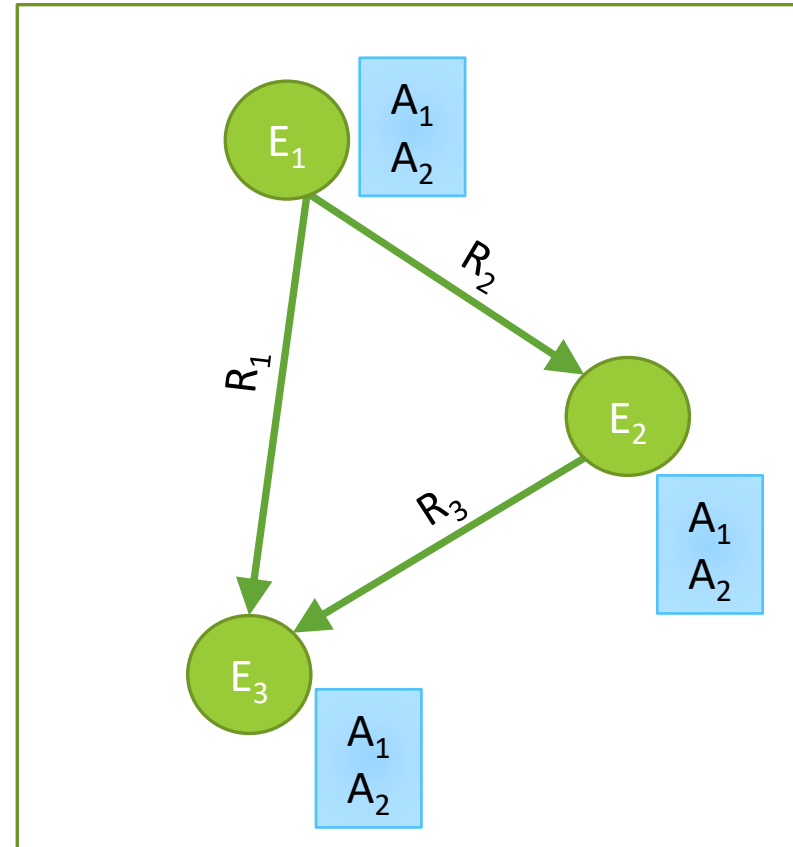
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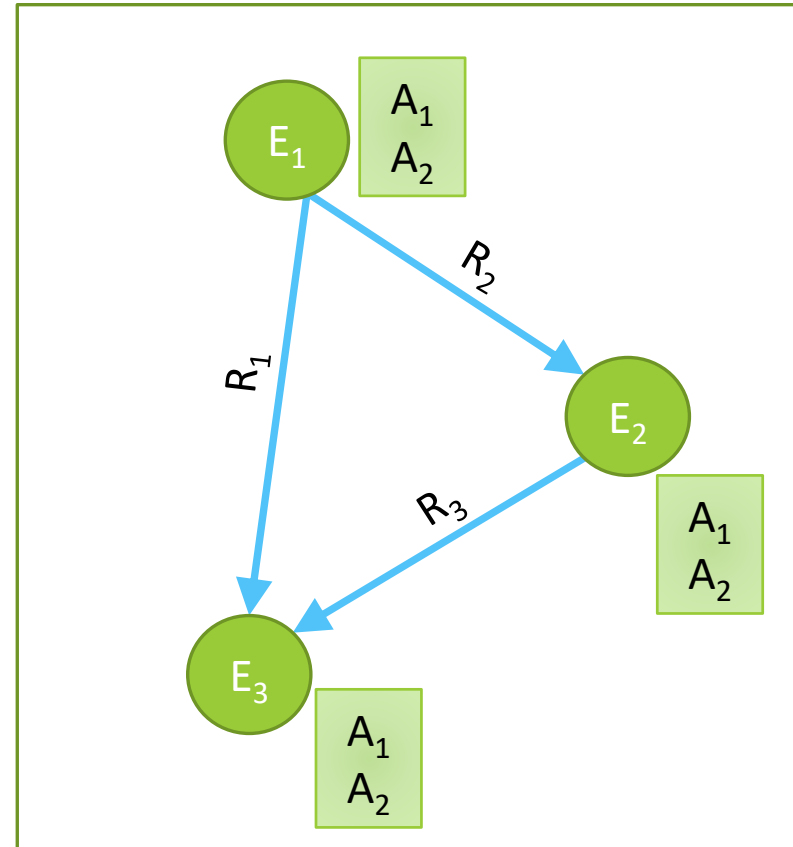
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# Basic problems

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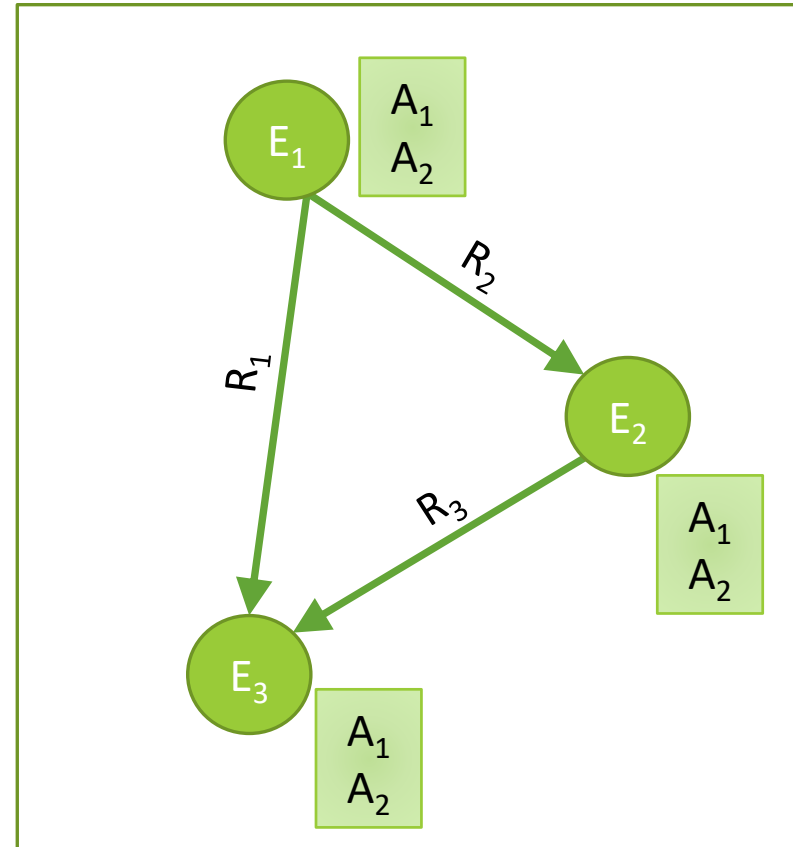




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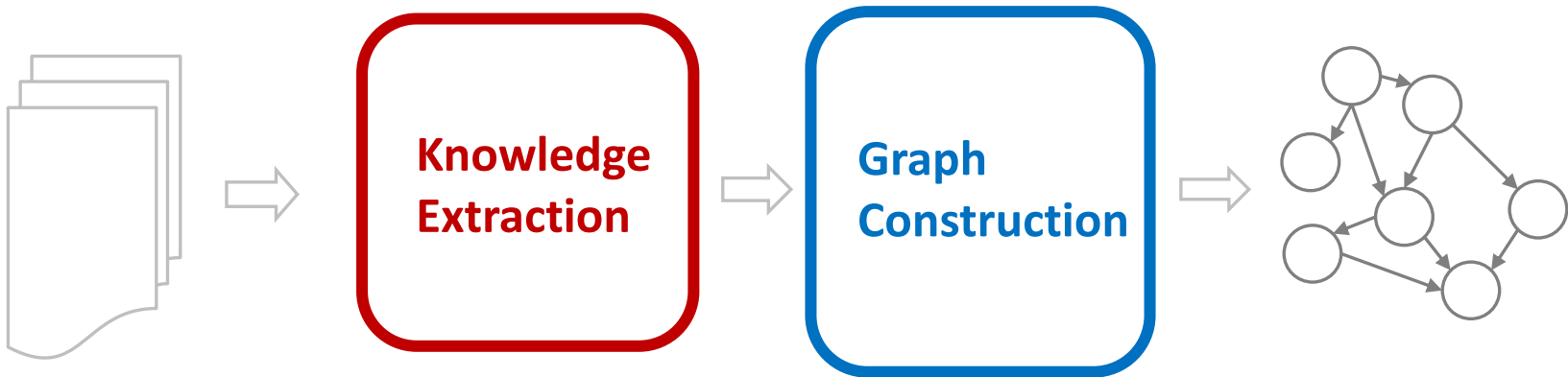
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# Knowledge Graph Construction

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# Two perspectives

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## Knowledge Extraction

- **Who** are the entities (nodes) in the graph?
  - Named Entity Recognition
  - Entity Coreference
- **What** are their attributes and types (labels)?
  - Named Entity Recognition
- **How** are they related (edges)?
  - Relation Extraction
  - Semantic Role Labeling

## Graph Construction

- **Who** are the entities (nodes) in the graph?
  - Entity Linking
  - Entity Resolution
- **What** are their attributes and types (labels)?
  - Collective Classification
- **How** are they related (edges)?
  - Link Prediction

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## 1. Knowledge Graph Primer [Jay]



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b. Information Extraction [Bhavana]



## Coffee Break



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a. Probabilistic Models [Jay]



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## 4. Critical Overview and Conclusion [Bhavana]

