

W1. Check List — Junyi

- ▼ What is a knowledge graph and components
 - ▼ A directed labeled graph in which the labels have well-defined meanings

Towards a Definition of Knowledge Graph



- Lisa Ehlringer and Wolfram, Poster, Semantics 2016, September 2016, Leipzig, <https://2016.semantics.cc/posters-and-demos-madness>.

Definition	Source
"A knowledge graph (i) mainly describes real world entities and their interrelations, organized in a graph, (ii) defines possible classes and relations of entities in a schema, (iii) allows for potentially interrelating arbitrary entities with each other and (iv) covers various topical domains."	Paulheim [16]
"Knowledge graphs are large networks of entities, their semantic types, properties, and relationships between entities."	Journal of Web Semantics [12]
"Knowledge graphs could be envisaged as a network of all kind things which are relevant to a specific domain or to an organization. They are not limited to abstract concepts and relations but can also contain instances of things like documents and datasets."	Semantic Web Company [3]
"We define a Knowledge Graph as an RDF graph. An RDF graph consists of a set of RDF triples where each RDF triple (s, p, o) is an ordered set of the following RDF terms: a subject $s \in U \cup B$, a predicate $p \in U$, and an object $U \cup B \cup L$. An RDF term is either a URI $u \in U$, a blank node $b \in B$, or a literal $l \in L$."	Färber et al. [7]
"[...] systems exist, [...], which use a variety of techniques to extract new knowledge, in the form of facts, from [...] knowledge bases. [...] knowledge has been referred to as a knowledge graph."	Pujara et al. [17]

um mainly containing real world entities
the relationships

Table 1: Selected definitions of knowledge graph

- ▼ Nodes
- ▼ Edges
 - ▼ A pair of nodes + relationship
- ▼ Labels
 - ▼ The meaning of relations
 - ▼ Needs documented explanations
- ▼ Knowledge graph and AI and semantic networks
 - ▼ A representation of AI
 - ▼ Semantic network is the earliest version KG
 - ▼ a Knowledge Graph is a variant of semantic network with added constraints whose scope, structure, characteristics and even uses are not fully realized and in the process of development.

▼ how to capture knowledge into the chosen representation in an economically scalable manner.

▼ Early approaches relied on knowledge engineering. Efforts to automate portions of knowledge engineering led to techniques such as inductive learning, and the current generation of machine learning

▼ KG and ML

▼ target output representation for natural language processing and computer vision algorithms → extraction

▼ As input: graph embedding

▼ represent each node in a knowledge graph by a vector, so that the similarity between the nodes can be calculated as a difference between their corresponding vectors. The vectors for each node are also referred to as graph embeddings

▼ To calculate knowledge graph embeddings, we define a method for encoding each node in the graph into a vector, a function to calculate similarity between the nodes, and then optimize the encoding function

▼ the simplest approach is to add the vectors for each of nodes in the graph and obtain a vector representing the whole graph