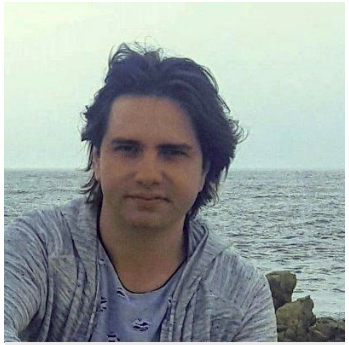
Commonsense Knowledge Acquisition & Representation



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Agenda

08:30 PST	10 mins	**Introduction to commonsense knowledge (Filip)**
08:40 PST	25 min	**Part I - Axiomatization of commonsense knowledge (Mayank)**
09:05 PST	40 min	**Part II - Consolidating commonsense knowledge (Filip)**
09:45 PST	15 min	Break
10:00 PST	45 min	**Part III - Extracting and contextualizing commonsense knowledge (Simon)**
10:45 PST	45 min	**Part IV - Language models, QA, and evaluation challenges (Antoine)**
11:30 PST	15 min	**Way forward: KGs+LMs+axioms? (Filip)**

Introduction to commonsense knowledge

Filip Ilievski

Adapted from the ISWC'20 CSKG Tutorial Introduction (by Pedro Szekely)

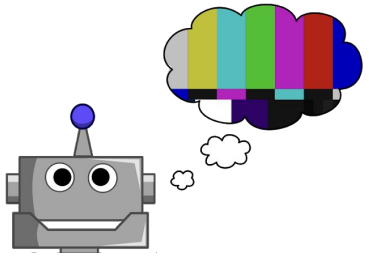
What Is Common Sense?

Common sense is sound practical judgement concerning everyday matters,

or a basic ability to perceive, understand, and judge that is shared by ("common to") nearly all people.

Wikipedia

Essential for humans to live and interact with each other in a reasonable and safe way.



Essential for AI to understand human needs and actions better

For example, it's ok to keep the closet door open, but it's not ok to keep the fridge door open, as the food inside might go bad.

Slide by Yejin Choi

A Common Sense Task

Input: a set of common concepts

dog | frisbee | catch | throw

Output: a sentence using these concepts

https://inklab.usc.edu/CommonGen/

A Common Sense Task

Input: a set of common concepts

dog | frisbee | catch | throw

Output: a sentence using these concepts

- A dog leaps to catch a thrown frisbee. [Humans]
- The dog catches the frisbee when the boy throws it.
- A man throws away his dog 's favorite frisbee expecting him to catch it in the air.

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A Common Sense Task

Input: a set of common concepts

Output: a sentence using these concepts

dog | frisbee | catch | throw

- A dog leaps to catch a thrown frisbee. [Humans]
- The dog catches the frisbee when the boy throws it.
- A man throws away his dog 's favorite frisbee expecting him to catch it in the air.

GPT2: A dog throws a frisbee at a football player. [Machines]

UniLM: Two dogs are throwing frisbees at each other .

BART: A dog throws a frisbee and a dog catches it.

T5: dog catches a frisbee and throws it to a dog

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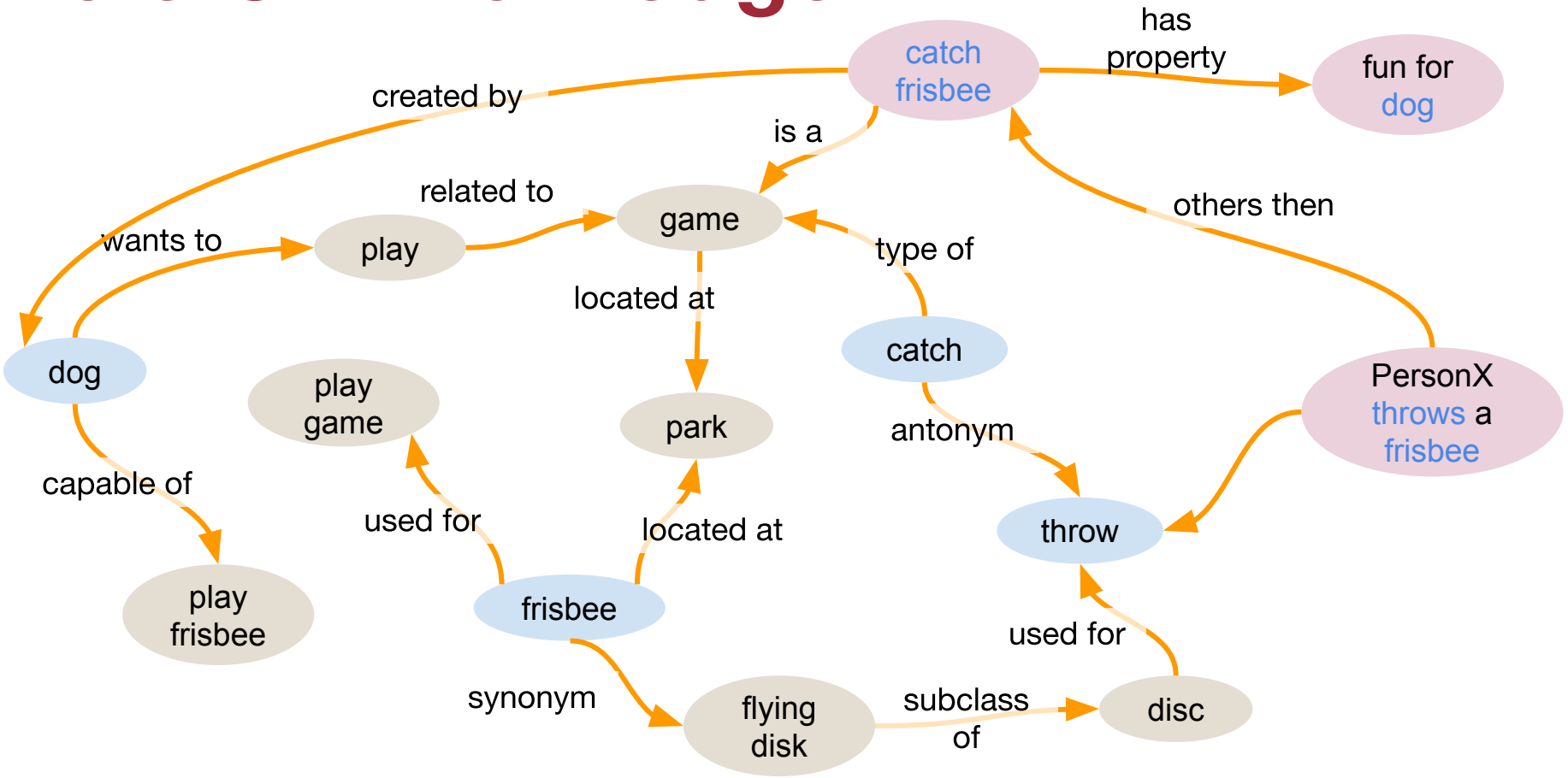
Role Of Knowledge



Common Sense Knowledge Sources

GenericsKB
[Bhakthavatsalam et al., 2020]

COMET
[Bosselut et al., 2019]

Atomic
[Sap et al., 2019]

Quasimodo KB
[Romero et al., 2019]

WebChild
[Tandon et al., 2014]

WebChild 2.0
[Tandon et al., 2017]

Open Mind Common Sense
[Minski, Singh, Havasi,1999]

ConceptNet
[Liu, Singh, 2004]

ConceptNet 5.5
[Speer et al., 2017]

NELL
[Carlson et al., 2010]

NELL
[Mitchell et al., 2015]

Wikidata
[Vrandečić, 2012]

Cyc
[Lenat et al., 1984]

OpenCyc 4.0
[Lenat 2012]

Aspects Of Common Sense Knowledge

Representation

- symbolic
- natural language
- neural

Acquisition method

- expert input
- crowdsourcing
- information extraction, machine learning

Knowledge type

- entities and actions
- inferential/rules

Topic

- general
- social

GenericsKB

COMET

Atomic

Quasimodo KB

WebChild

ConceptNet

NELL

Wikidata

OpenCyc

Representation Method

Representation

- symbolic: frisbee, dog
- natural language: "PersonX throws a frisbee"
- neural: <black box>

Acquisition method

- expert input
- crowdsourcing
- information extraction, machine learning

Knowledge type

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GenericsKB

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Acquisition Method

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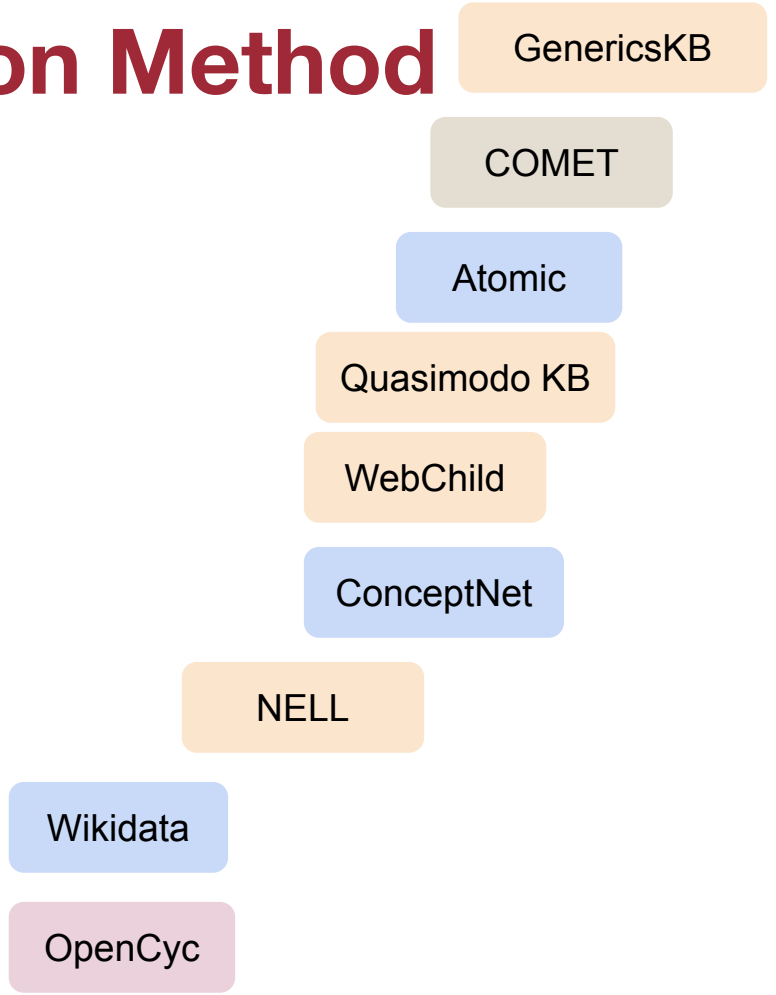

Knowledge Type

Representation

- symbolic
- natural language
- neural

Acquisition method

- expert input
- crowdsourcing
- information extraction, machine learning

Knowledge type

- entities and actions: frisbee, dog, throw, catch
- inferential/rules: PerX throws frisbee, others catch it

Topic

- general
- social

GenericsKB

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Topic

Representation
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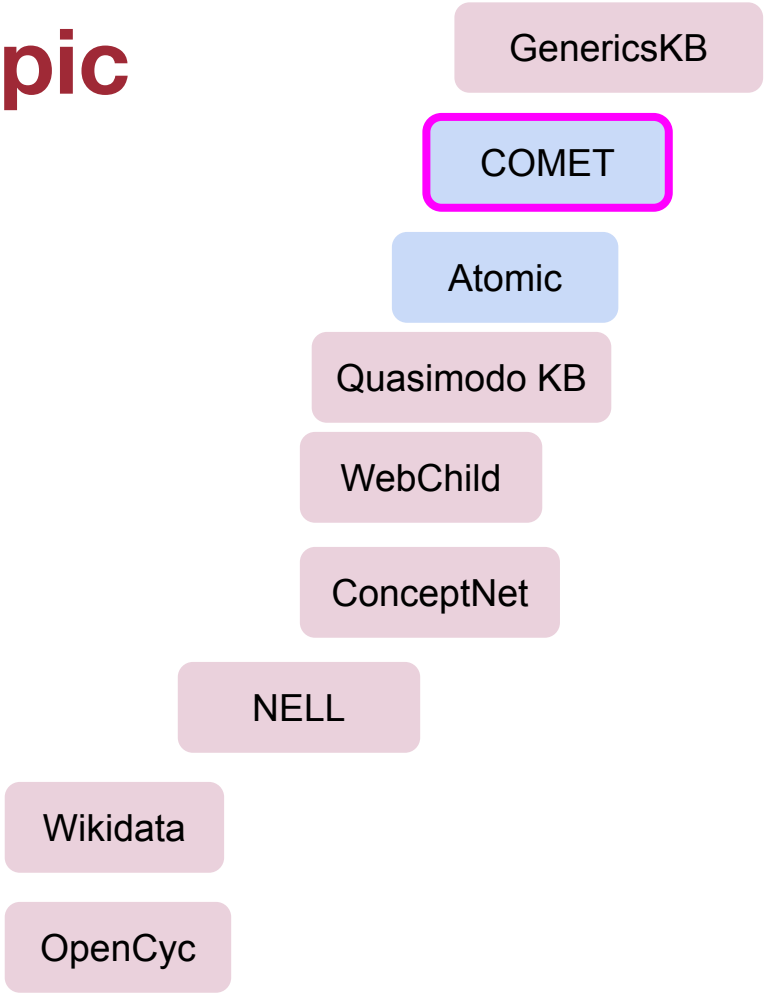


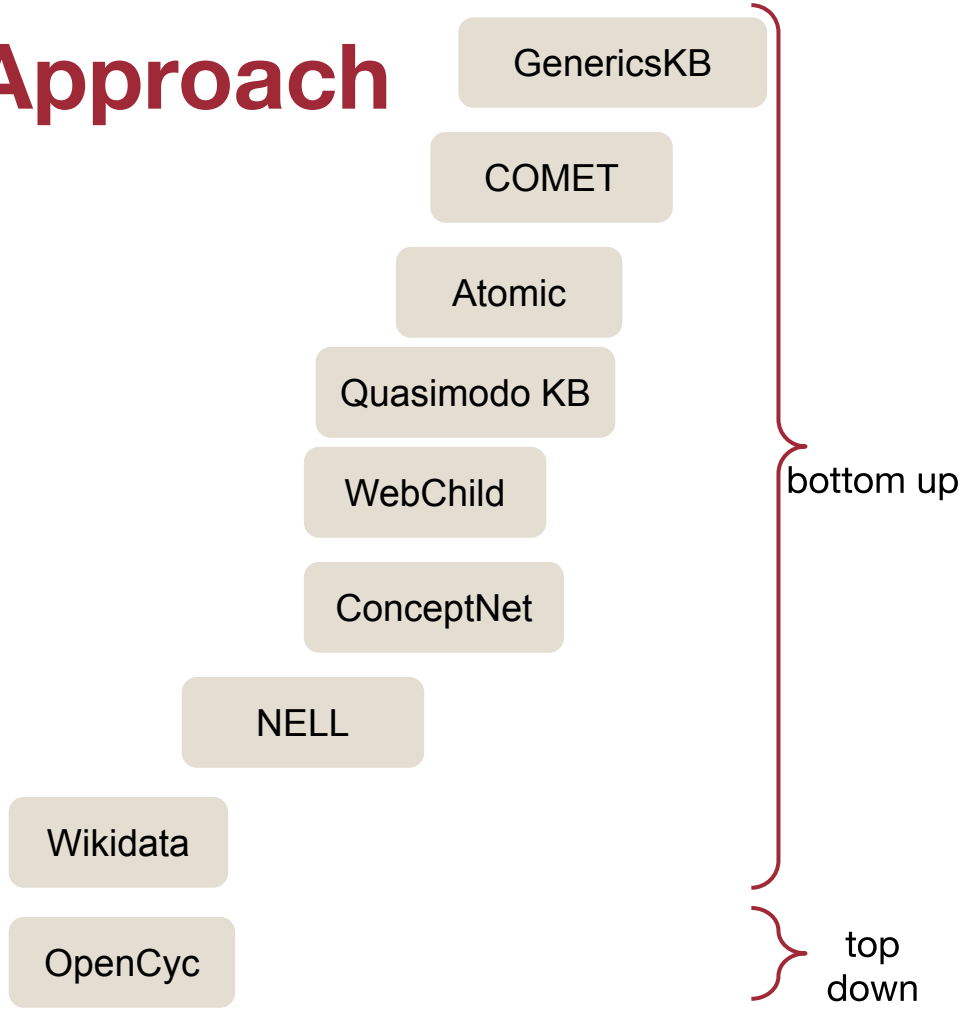
Design Approach

Representation
- symbolic
- natural language
- neural

Acquisition method
- expert input
- crowdsourcing
- information extraction, machine learning

Knowledge type
- entities and actions
- inferential/rules

Topic
- general
- social



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