

Definition of Intelligence with Linear Orders for Ontologies

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Introduction

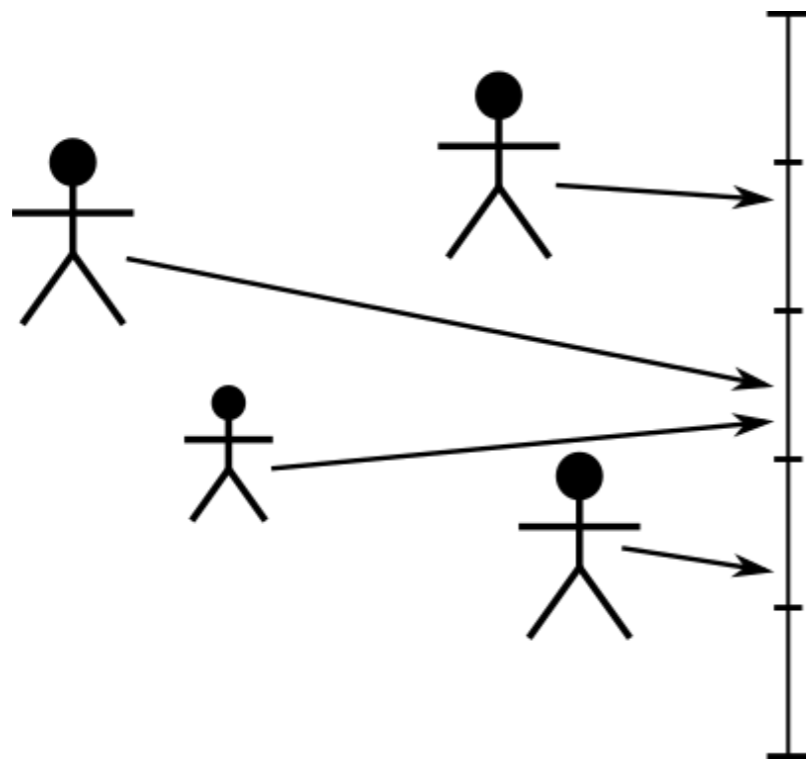
- Ontologies of intelligence is a topic that has scarcely been tackled. [e.g. Flynn 1987]
- Despite its broad usage nowadays.
 - ▶ Human and animal intelligence
 - ▶ Artificial Intelligence
 - ▶ *Smartphone*
- The science of intelligence will remain difficult without an ontology of intelligence.
- We need a consensus.

Definitions of Intelligence

- The first step is to define intelligence.
 1. General definitions: Too ambiguous and subjective.
E.g. *“Intelligence measures an agent’s ability to achieve goals in a wide range of environments.”* [Legg & Hutter 2007]
 2. Formal definitions: Limited to a restricted set of capabilities.
E.g. *“Intelligence is the ability measured by the IQ test, known as the g factor.”* [Sternberg 1977]
 - ▶ Human definitions rely on IQ tests.
 - ▶ Machine definitions rely on Fitness Functions.
- ➔ Formal definitions of intelligence define a linear order on the test subjects.

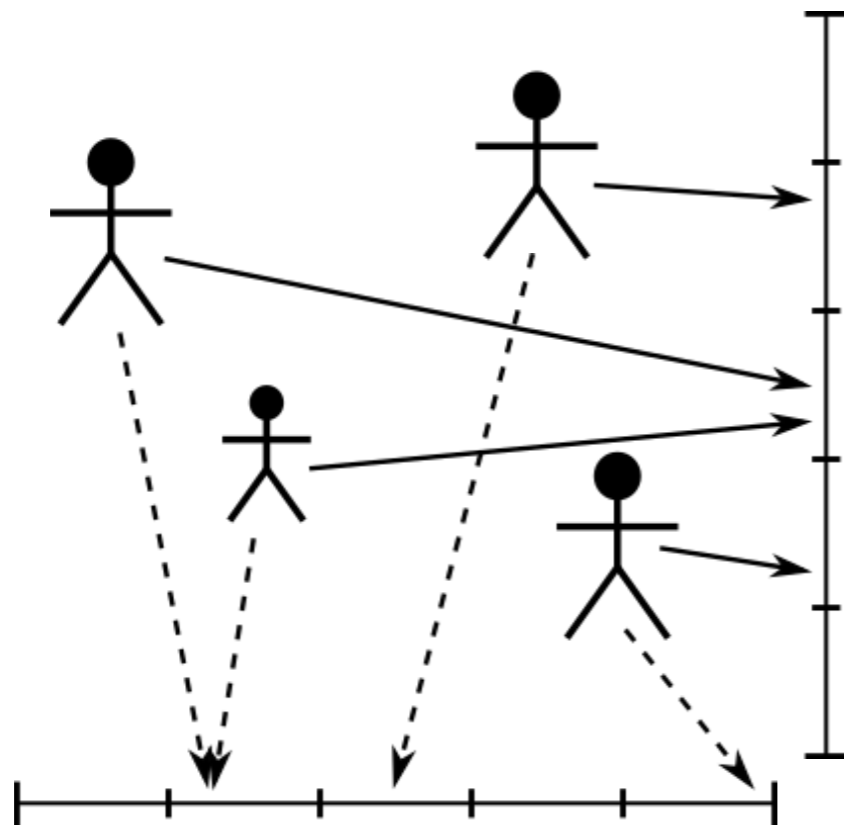
Measuring Intelligence

- Formal definitions of intelligence measure the degree of accomplishment of a given objective.
- The objective is defined implicitly in the IQ test / fitness function.



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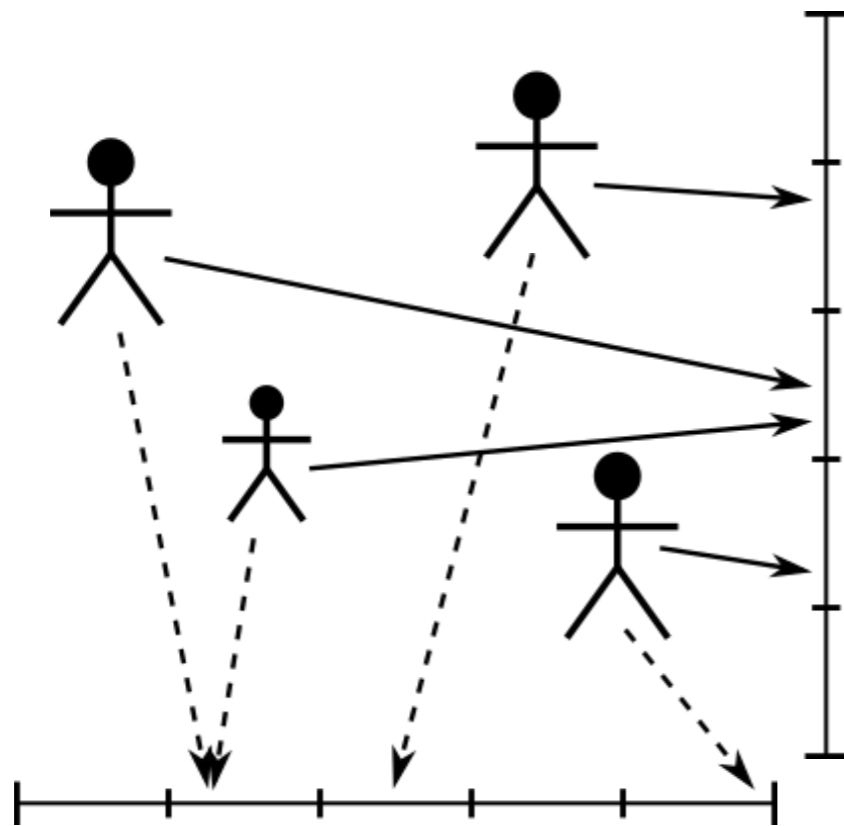
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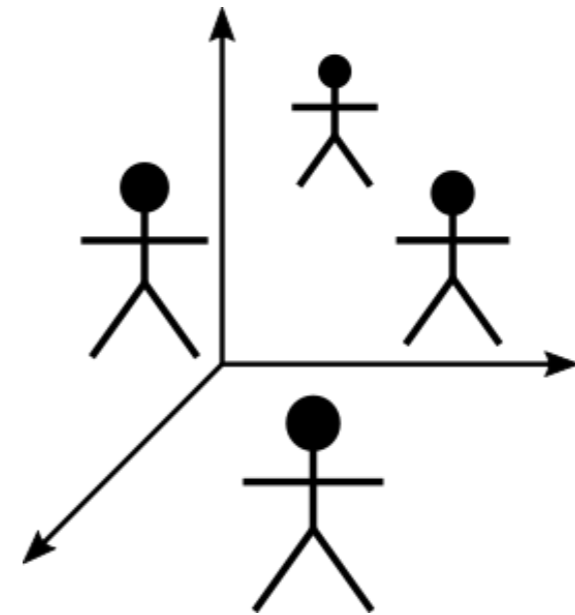
2 IQ tests / Fitness Functions
combined

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2 IQ tests / Fitness Functions
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Ordered Vector Spaces

Discussion

- Subjects are incomparable unless they are compared against a single definition of intelligence.
- Many definitions of intelligence must be *summarized* to a single one to allow comparisons:
E.g. “*Capability of performing well at task A and B.*”
E.g. “*Capability of performing well at task A or B.*”
- We need as many definitions of intelligence as possible objectives.

Conclusions

- The definition of *Intelligence* is strongly connected to objectives.
- Defining intelligence is equivalent to defining an objective.
- The ontology of intelligence is equivalent to the ontology of objectives.

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Muchas gracias por su atención

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