

Module 1: Crash course in AI

INFO901

Marija Slavkovik 2022

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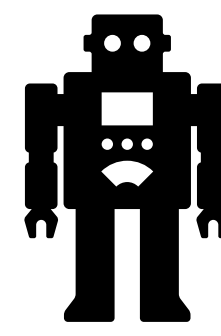
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ML for decision making

- What does it mean to use machine learning to make a decision?
- An option is described with features, labeled with choose or not choose
- Assigning a label is often called a “decision” or “recognition”

Deduction/abduction for decision making

- What does it mean to use reasoning to make a decision?
- The constraints and preferences are represented as rules
- Properties of the options are represented as facts
- For each of the possible options check if the option is consistent with the constraints and preferences

Other approaches

- Algorithmic decision theory
- Algorithmic game theory
- Multi-criteria decision making/aiding
- Information theory

What does it mean for a machine to learn?

- Machine learning is an algorithm
- Like all algorithms it has input and produces output
- The input is a data set
- For supervised learning, the output is a prediction model
 - for decision trees this is a set of if-then rules
 - for linear methods and neural networks, this is a list of weights (for the linear equation)
 - for SVM this is a pair of data points (the support vectors)

Observe!

- “learning” is building a prediction model
- “deciding” is applying the prediction model to new data
- once created the prediction model is not meant to be changed (it does not automatically adapt to new data)

Solving problems with AI

Simplify environments and build complex reasoning systems for these simple environments. For example, factory robots can do sophisticated tasks in the engineered environment of a factory, but they may be hopeless in a natural environment. Much of the complexity of the task can be reduced by simplifying the environment.

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Simple agents in natural environments. This is inspired by seeing how insects can survive in complex environments even though they have very limited reasoning abilities. Increase the agents reasoning abilities of the agents as their tasks become more complicated.

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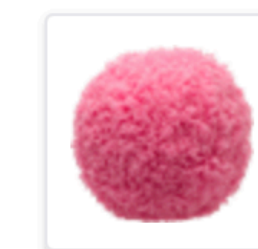


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Robotstøvsuger som ruller og samler støv

Mocoro Mop Ball | Art. nr.: 102680

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 - If everyone chooses the meaning as they please the result is ethics washing
 - If we do not know why we are pursuing a property, what is it all for?

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- *Are ethical principles a shortcut for “interests of others”?*

Why now?



Bias in the development and use of an expert system: implications for life cycle costs

Barry Shore ▾

Industrial Management & Data Systems

ISSN: 0263-5577

Article publication date: 1 June 1996

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Abstract

Suggests that the development and use of an expert consulting system is vulnerable to biases in the subject-matter expert, knowledge-engineer, validators, maintainers and end-users. An expert system, developed at a large insurance company, is used to study these biases. An economic model is then built to evaluate the trade-offs which must be considered in the process of managing the source of these biases over the life cycle of an application.

What has changed?

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- Example: ImageNet and image recognition

Example: ImageNet

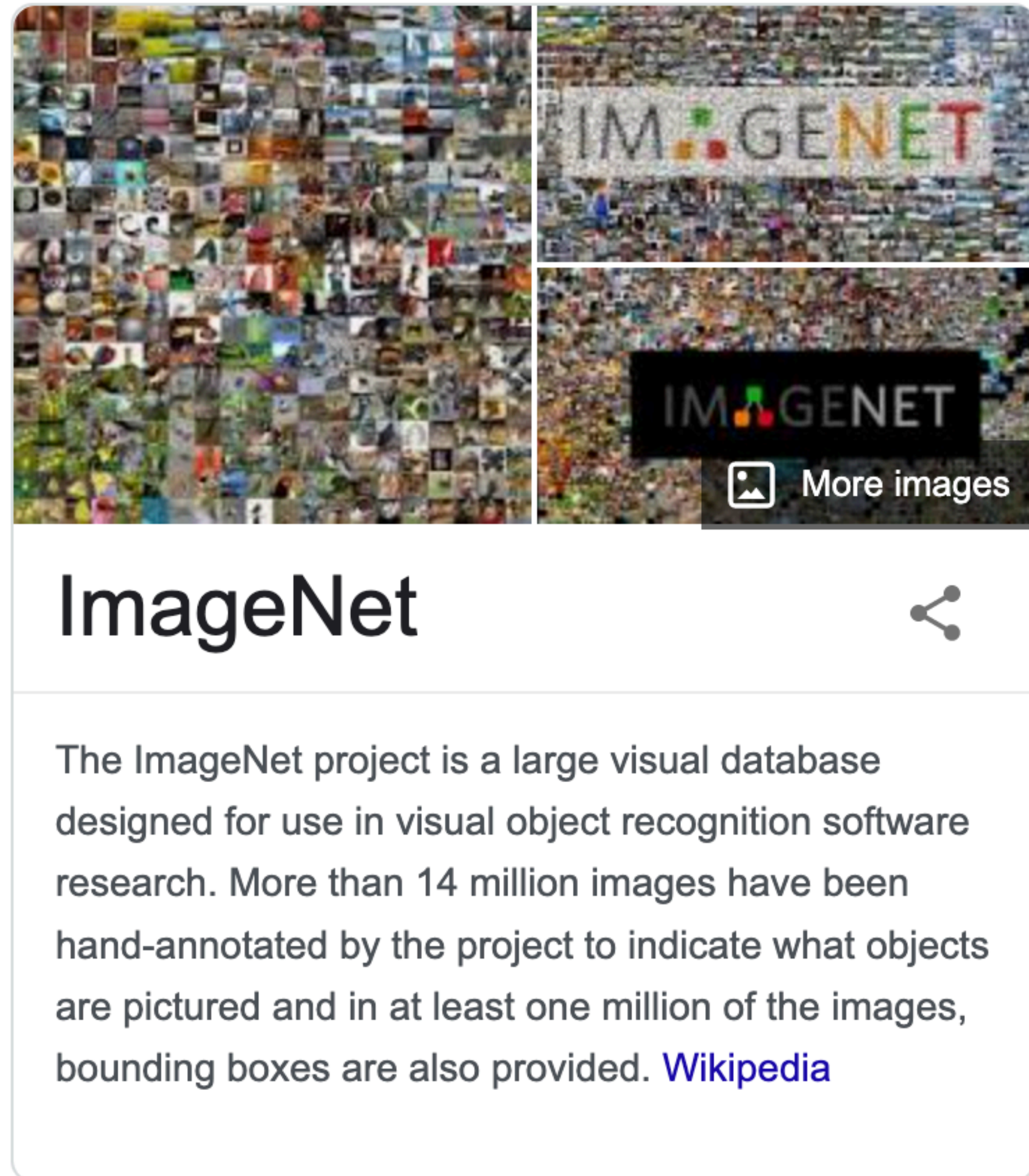


ImageNet



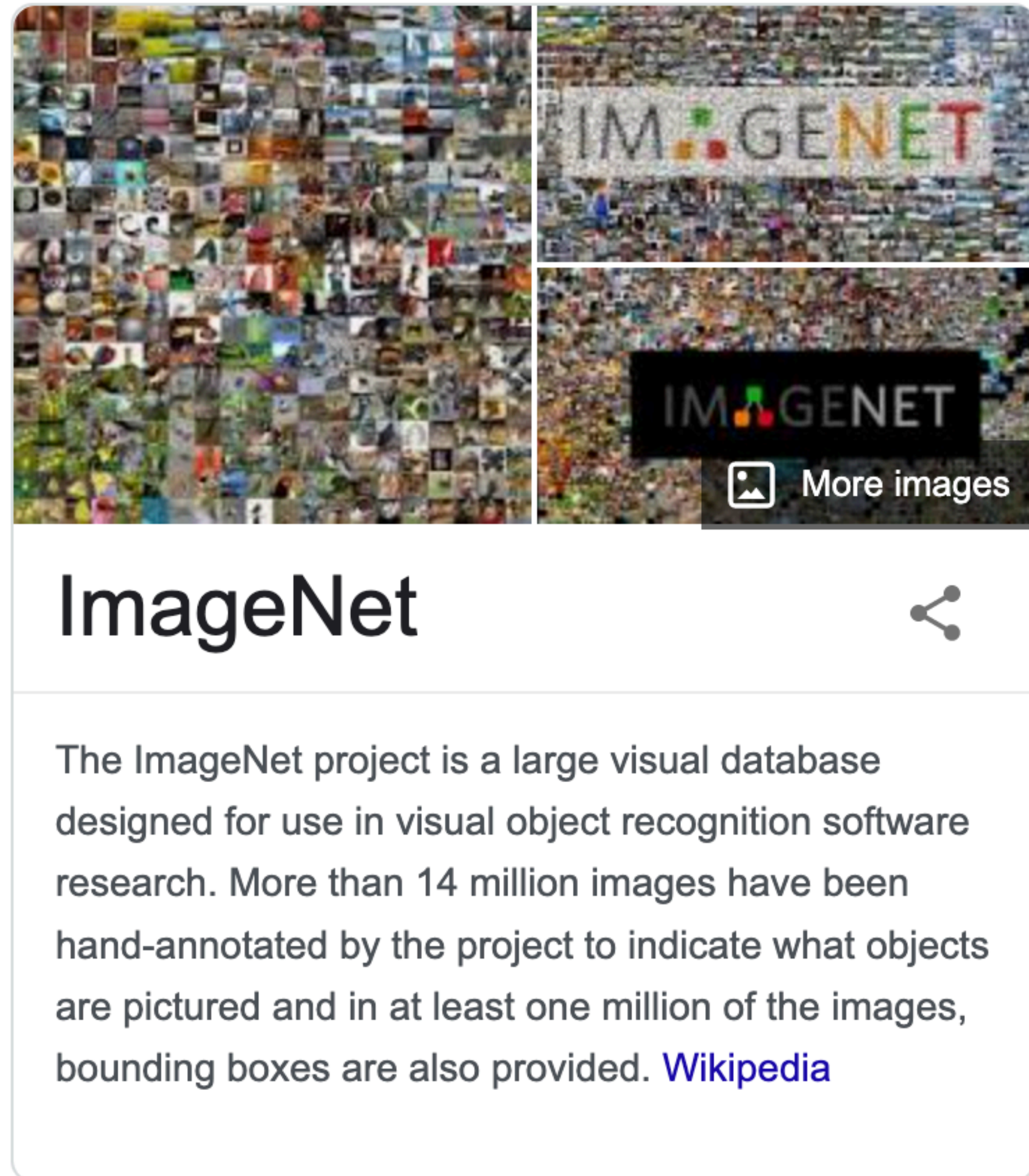
The ImageNet project is a large visual database designed for use in visual object recognition software research. More than 14 million images have been hand-annotated by the project to indicate what objects are pictured and in at least one million of the images, bounding boxes are also provided. [Wikipedia](#)

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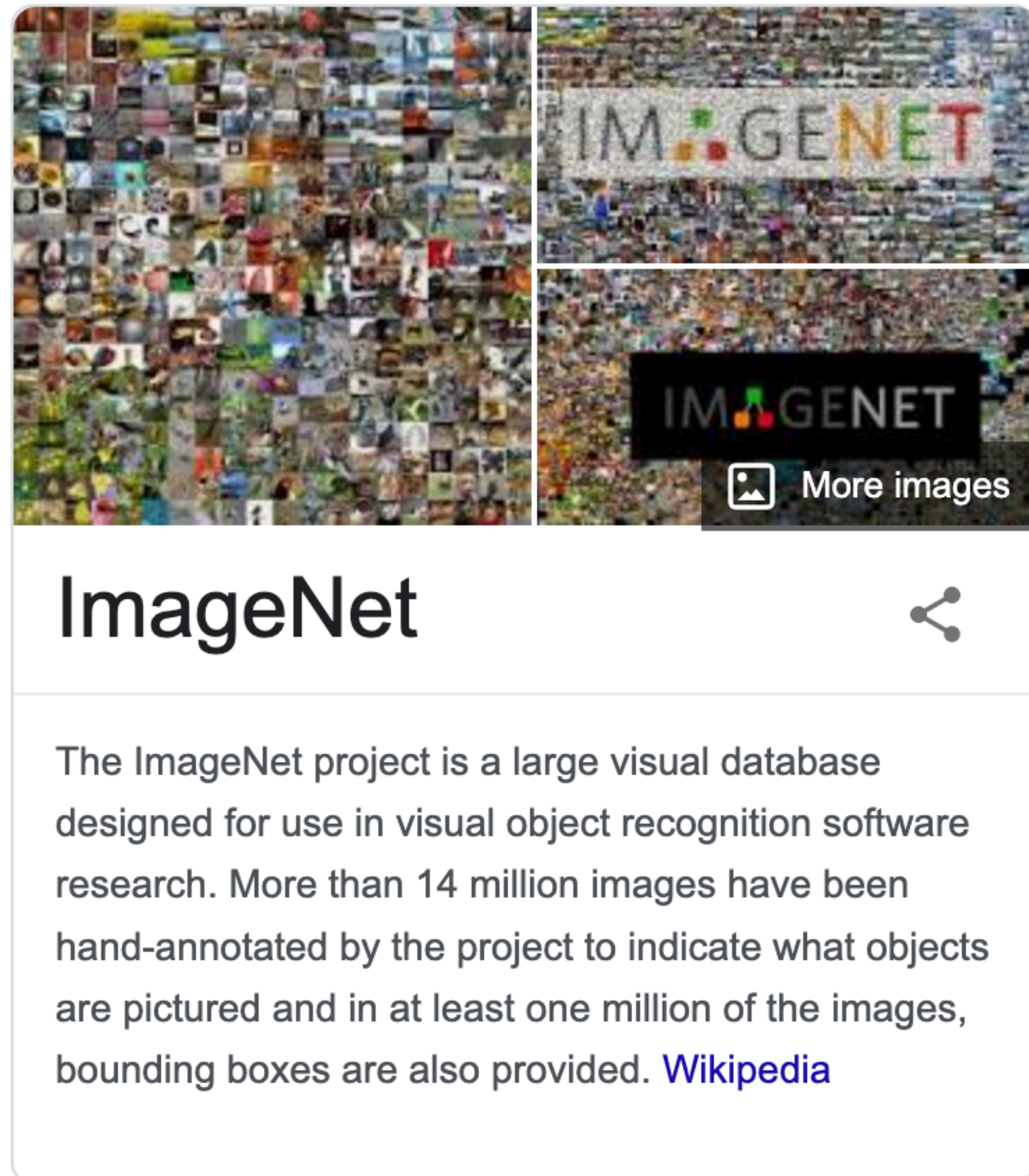
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- Images from the surroundings of the annotators
- A chair is always shown without clothes on it
- A chair in nature is rarely without clothes on it

What is AI?