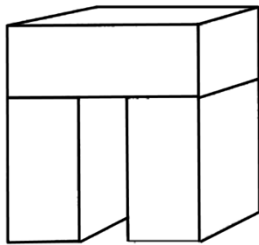


Artificial Intelligence Fundamentals

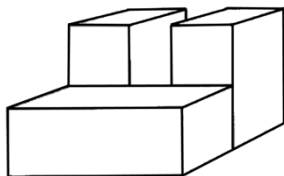
Learning: Near misses, Felicity
Conditions

A different type of learning

- Learning by analyzing the differences that appear in a sequence of observations
- Learning in a human-like way from a single example in one shot
- Learning something definite from every example
- How can that happen ?

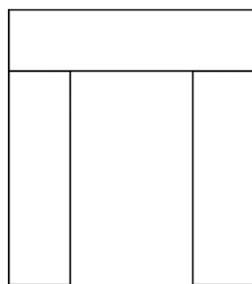


- Arch
- Got a general idea
- What's important ?

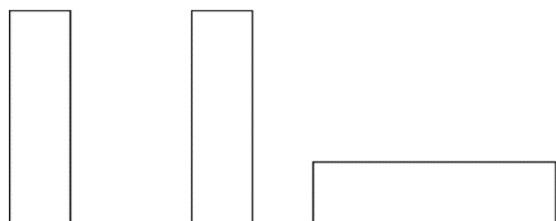


- Not an arch
- Learn something very different

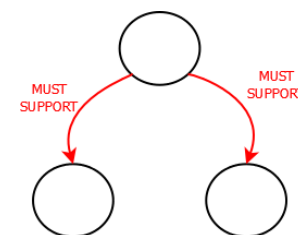
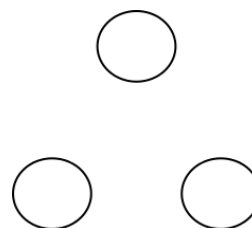
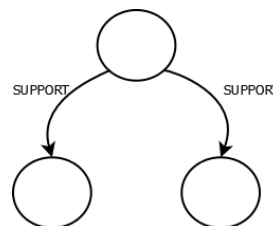
Step 1 – Require link heuristic (specialization)



- Initial model
- Is the starting point

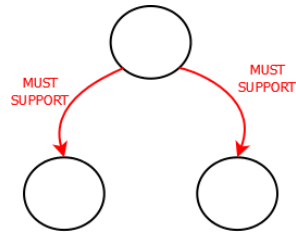


- Near miss

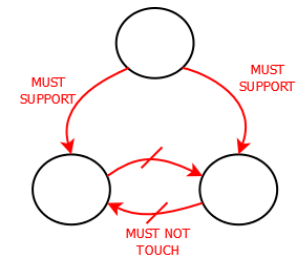
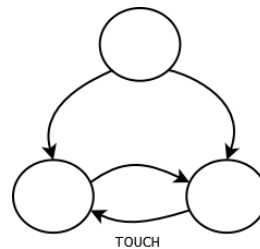
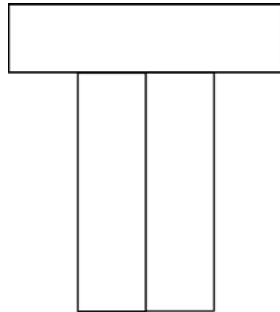


- only 1 difference
- Support relations are important

Step 2 – Forbid link heuristic (specialization)



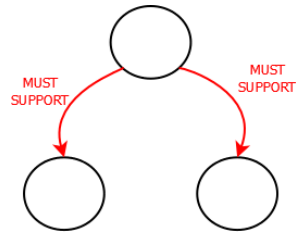
- Evolving model



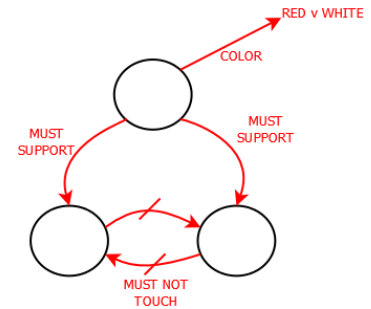
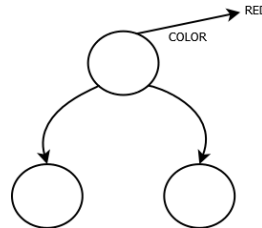
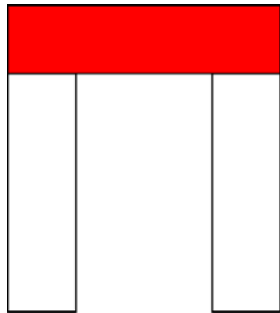
- only 1 difference
- Not touch relations are important

- Near miss

Step 3 – Extend set heuristic (generalization)



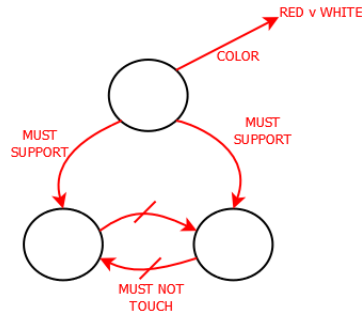
- Evolving model
- Color of the top is white



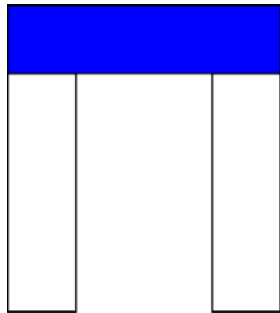
- only 1 difference
- The color relation is important

- Example

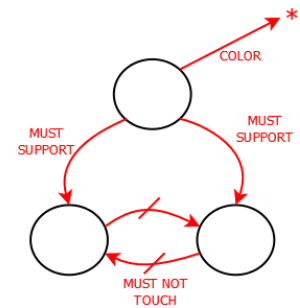
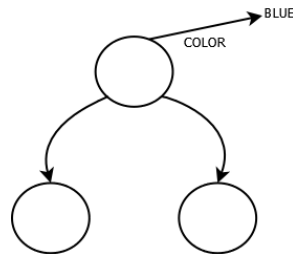
Step 4 – Drop link heuristic (generalization)



- Evolving model

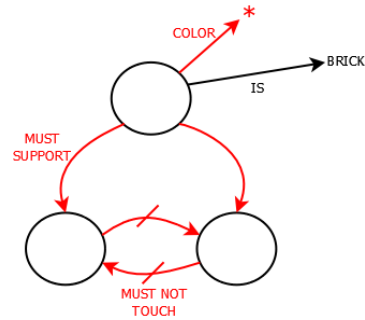


- Example

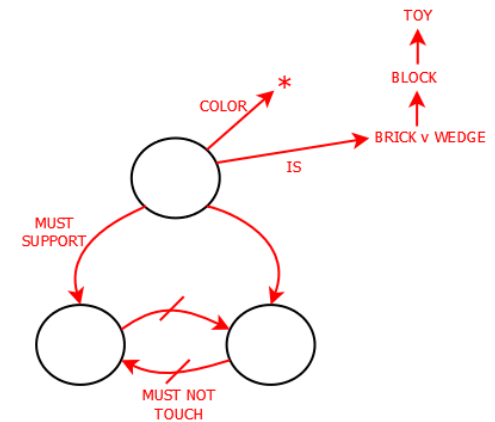
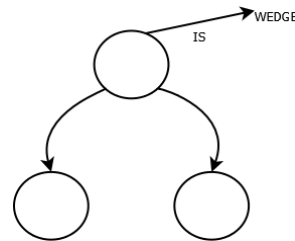
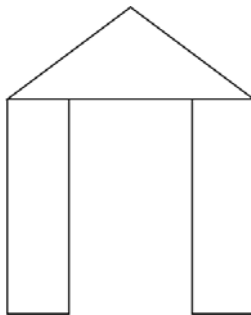


- only 1 difference
- The color relation – anything can be here

Step 5 – Climb tree heuristic (generalization)



- Evolving model



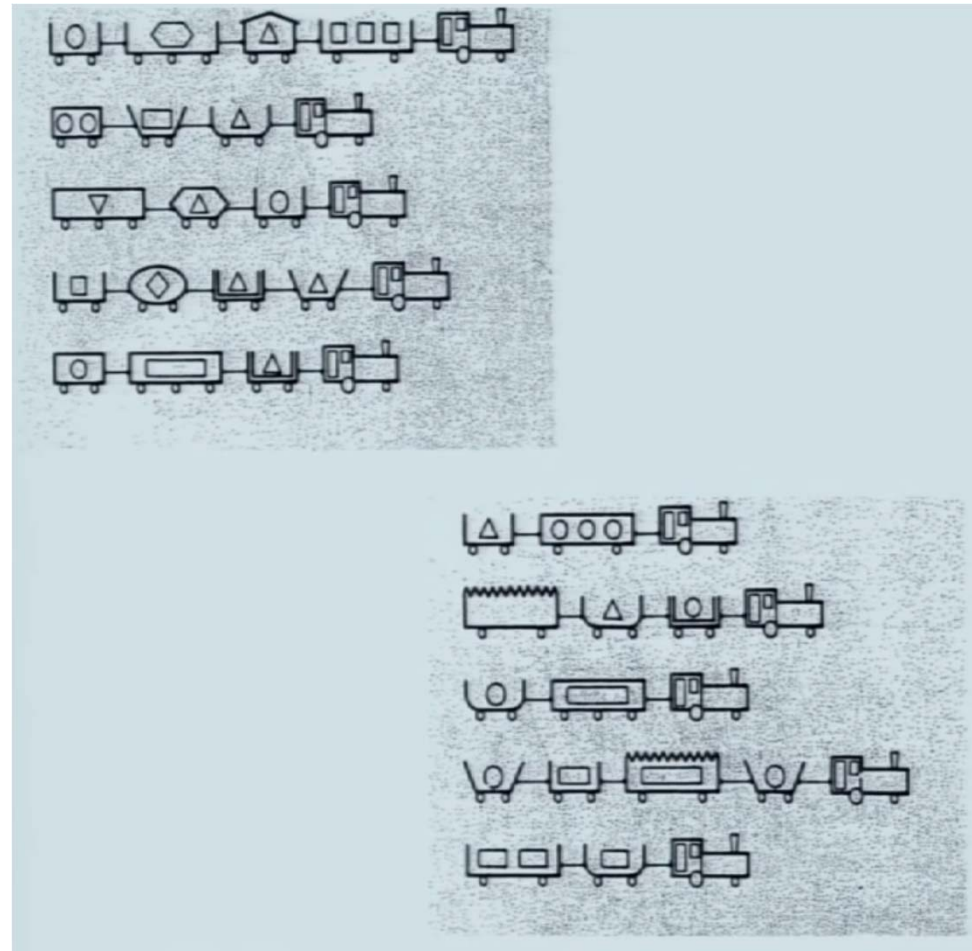
- only 1 difference
- The hierarchy - generalization

- Example

Deploying the heuristics

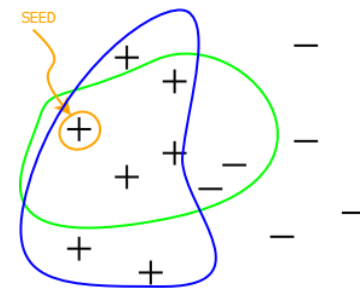
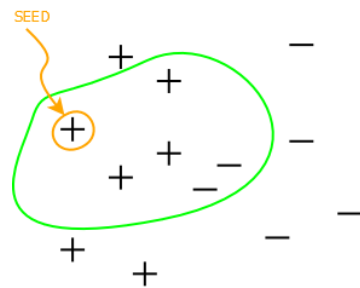
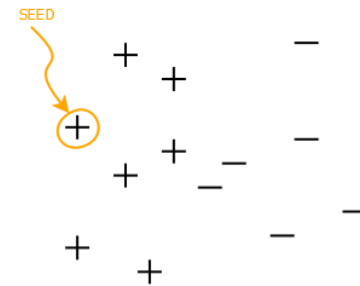
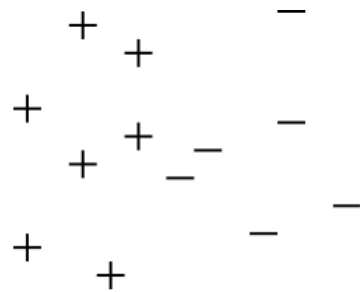
- Examples are presented one at a time by a teacher who's eager for the student to learn
 - Combine generalization with specialization
 - Require a teacher
 - Need to do with a human (don't have much memory)
- If the examples are presented all at once:
 - Pick one of the positive examples to work (SEED) – it's an exactly description of a particular thing
 - Search for one heuristic that loosens the description so that it covers more of the positives (expand the description)
 - It cover 2 negative examples
 - Continue until eliminate all negative examples and keep only the positive ones
 - Beam search
 - Can be done in batches
 - Computer is very good at this (lots of memory)

Distinguish the top from bottom



The top trains all have a short car with a closed top.

All at once deploying



Beam search.

Felicity conditions

- Require a teacher, a student and covenants that hold between them
- Transform an initial state of knowledge into a new state of knowledge -> the student is smarter
- For learning – one side has to know something about the other side:
 - Teacher
 - Initial state of knowledge
 - The way that the student learns
 - The computational capacity & the uses of knowledges
 - Learner
 - Trust

