

19/11/24  
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INB - 08:

First order language & unification

→ Implementing unification.

1. The ocean covers about 70% of the Earth's surface.
2. Light travels faster than sound.
3. The moon influences the Earth's tides through its gravitational pull.
4. Electricity powers most of the technology we use today.
5. The process of evolution explains how species adapt over time.
6. Plants absorb CO<sub>2</sub> & release Oxygen, contributing to the planet's atmosphere.
7. The human heart pumps blood throughout the body to deliver oxygen & nutrients.
8. Whether it's the oceans, the air, or our own bodies, everything on Earth is interconnected, working together to sustain life.

The last sentence brings together all knowledge from previous ones.

1.  $\rightarrow x \text{ (Ocean}(x) \rightarrow \text{Covered } x \text{ contains}(y)$   
 $\text{Marine life}(y) \rightarrow \text{sustaining}(x, y)$
2.  $\rightarrow x \text{ w/y (Lightning}(x) \wedge \text{Thunder}(y))$   
 $\rightarrow x \text{ speed}(x) > \text{speed}(y)$
3.  $\rightarrow x \text{ w/y (Moon}(x) \wedge \text{Tides}(y))$   
 $\rightarrow \text{Influences}(x, y)$
4.  $\rightarrow x \text{ (Electricity}(x) \wedge y \text{ (Technology}(y))$   
 $\rightarrow \text{Power}(x, y))$
5.  $\rightarrow x \text{ (Species}(x) \exists y \text{ (Adaptation}(y))$   
 $\rightarrow \text{LeadsTo}(x, y))$
6.  $\rightarrow x \text{ (Plant}(x) \rightarrow \exists y \text{ (Photosynthesis}(y) \wedge$   
 $\text{contributesTo}(y, \text{Oxygen}) \wedge \text{regulating}(y,$   
 $\text{Atmosphere}))$
7.  $\rightarrow x \text{ (Heart}(x) \rightarrow \exists y \text{ (Organism}(y) \rightarrow$   
 $\text{circulates}(x, y) \wedge \text{Delivers}(x, y, \text{Oxygen}))$
8.  $\rightarrow x \text{ unified}$   
 $\rightarrow x \exists y \exists z \text{ (Earth}(x) \wedge \text{Air}(y) \wedge \text{Organism}(z))$   
 $\rightarrow \text{Interconnected}(x, y, z) \wedge \text{WorksTogether}(x,$   
 $y, z))$

$x \rightarrow$   $\text{Earth}$

$y \rightarrow$   $\text{Air}$   
 $\rightarrow \text{Organisms}$

$z \rightarrow$   $\text{Organisms}$

$\text{Dom}$   
 $\text{Interaction}$

program :

knowledge base = L

L = { "type": "rule", "rule": "x > y (programmer(x) & project(y)) → writes(x, y)" },  
 { "type": "fact", "fact": "programmer(Alice)" }  
 { "type": "fact", "fact": "project(projectx)" },  
 { "type": "rule", "rule": "x > y (writes(x, y) & assignedTo(x, y)) → canAccess(x, y)" },  
 { "type": "rule", "rule": "x > y (assignedTo(x, y) & assignedTo(y, z)) → canAccess(x, z)" },  
 { "type": "fact", "fact": "AssignedToBob", "project": "projectx" } ] }

query = { "predicate": "(canAccess", "arguments": [ "Alice", "Bob" ] ),  
 "negates": false, "projection": "projects" } ] }

def unify(KB, query):  
 predicate = query["predicate"]  
 target\_project = query["arguments"]  
 [ 1 ]  
 result = []

for item in KB:

if item["type"] == "rule" and predicate  
 in item["rule"]:

rule = item["rule"]

if "AssignedTo(x,y)" in rule and  
"eohAccess(x,y)" in rule

for fact in kb:

if fact["type"] == "fact" and "AssignedTo(x,y)" in fact["fact"]  
factparts = fact["fact"].split()  
"(0)[1].strip()") - split(",")

person.project = fact-parts

if project == targetProject:  
result.append(person)

If result:

return f"The query '{query}' predicate  
[Every [arguments] [0]],  
[targetProject] is unified if  
..., join(result) plan access to  
-project 1."

else

return f"The query '{query}' predicate  
[Every [arguments] [0]],  
[targetProject] couldn't be unified."

~~result = unify(knowledge-base, query)~~  
print(result)

~~out put:~~

~~The query 'canAlice?', project X',  
is unified: Bob can Access project~~

~~Dom  
stable~~