Inference of Semantic Structures

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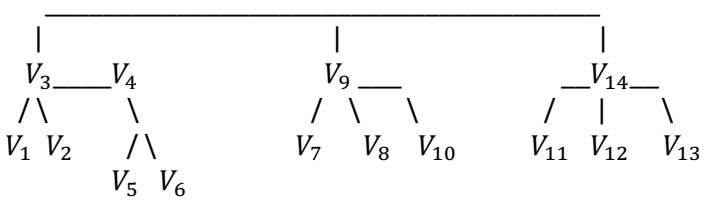
Stages in the Semantic Inference Process

1. Identifying Semantic Structures which are related and can be used for creating an Inference Building Template
2. Creating an Inference Building Template
3. Identifying Semantic Structures for application of the Inference Building Template
4. Applying the Inference Building Template
5. Inference as a special case of Execution of Semantic Structures

Identifying Semantic Structures for creating an Inference Building Template

This is done by applying a special *Recognizer Template* to the Semantic Structures which are close enough semantically. Let us consider two semantic structure which could serve is input for building inference template:

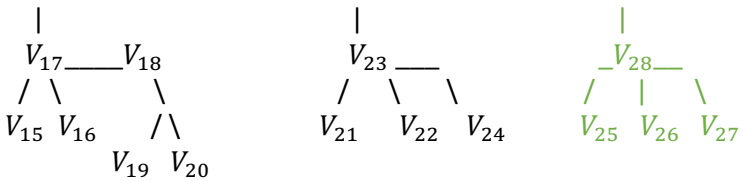
Learning data:
Humans can breathe using their lungs.
Fish don't have lungs. Therefore, fish don't breathe.
Cars can move using their engines.
Bicycles do not have engines. Therefore bicycles do not move.
People can walk using their legs. Snakes do not have legs.



text(V_1) = "Humans"
text(V_2) = "can"
text(V_3) = "breathe"
text(V_4) = "using"
text(V_5) = "lungs"
text(V_6) = "their"

text(V_7) = "Fish"
text(V_8) = "don't"
text(V_9) = "have"
text(V_{10}) = "lungs"

text(V_{11}) = "Therefore"
text(V_{12}) = "fish"
text(V_{13}) = "don't"
text(V_{14}) = "breathe"

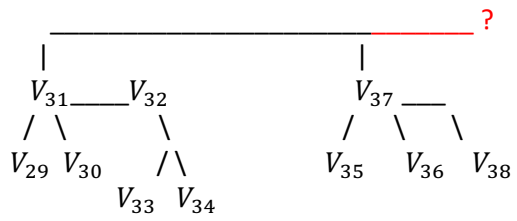


text(V_{15}) = "Cars"
text(V_{16}) = "can"
text(V_{17}) = "move"
text(V_{18}) = "using"

text(V_{21}) = "Bicycles"
text(V_{22}) = "don't"
text(V_{23}) = "have"
text(V_{24}) = "engines"

text(V_{25}) = "Therefore"
text(V_{26}) = "bicycles"
text(V_{27}) = "don't"
text(V_{28}) = "move"

text(V_{19}) = “engines”
text(V_{20}) = “their”



text(V_{29}) = “People”
text(V_{30}) = “can”
text(V_{31}) = “walk”
text(V_{32}) = “using”
text(V_{33}) = “legs”
text(V_{34}) = “their”

text(V_{35}) = “Snakes”
text(V_{36}) = “don’t”
text(V_{37}) = “have”
text(V_{38}) = “legs”

$T_1 : [V_i\ A_j, i = 1..6, j = 1..5]$
$T_2 : [V_i\ A_j, i = 7..10, j = 6..8]$
$T_3 : [V_i\ A_j, i = 11..14, j = 9..11]$
$T_4 : [V_i\ A_j, i = 15..20, j = 12..16]$
$T_5 : [V_i\ A_j, i = 21..24, j = 17..19]$
$T_6 : [V_i\ A_j, i = 25..28, j = 20..22]$
$T_7 : [V_i\ A_j, i = 29..34, j = 23..27]$
$T_8 : [V_i\ A_j, i = 35..38, j = 28..30]$

Training set: $T_1, T_2 \rightarrow T_3; T_4, T_5 \rightarrow T_6$
Test set: $T_7, T_8 \rightarrow T_9$

How could the inference work? Generally, by setting up a predictor (regressor, neural net, etc) and train it. But the question really is what is the best way to perform inference when dealing with semantic structures?
Simple way to perform the learning step: *semantic structure property swarm with adaptive plasticity*. The properties which are “seen” more than once in the training examples on similar relative locations are strengthened. Tuning the strengthening algorithm with a meta-algorithm is desirable. How does the meta algorithm do the tuning? One output of the tuning algorithm would be the strengthening or weakening of the retainability rank of each property. Second optimization cohort in the algorithm would be to maintain alternative property representation for each semantic particle and to rank each alternative representation.

Creating an Inference Building Template
Identifying Semantic Structures for Template Application
Applying the Inference Building Template
Inference as a special case of execution of a Semantic Structures