Fovad & Backward Caining

- FovadCaining
- FCExample
- BackwardCaining
- BCEamples

FovadCaining

- DataDiver

  Start with sentence or fact from the KB
  i.e. Name(Joe)

  Generate new facts or sentences from rules having known facts in the KB
  i.e. Name(x) => IsCool(x)

  Reach Conclusion(s)
  i.e. Joe is cool!
FowardChainingAlgorithm

- \textbf{ForwardChaining} (KB, p)

for each rule such that \( p \) unifies with a premise

if the other premises are \textit{known} then

add the conclusion to the KB and continue chaining.

\textbf{Examples...}

- \( p \)  \( \rightarrow \) Name(Joe)
- Premise 1  \( \rightarrow \) Name(x)
- Premise 2  \( \rightarrow \) Name(x)  \( \Rightarrow \) IsCool(x)
- Premise 3  \( \rightarrow \) Name(x)  \( \land \) Brother(y)  \( \Rightarrow \) Related(x,y)
- Conclusion  \( \rightarrow \) Joe is cool!

FowardChainExample

\textbf{Facts in the KB:}

- Cheetah(x)  \( \land \) Dog(y)  \( \Rightarrow \) Faster(x,y)
- Dog(y)  \( \land \) Turtle(z)  \( \Rightarrow \) Faster(y,z)
- Faster(x,y)  \( \land \) Faster(y,z)  \( \Rightarrow \) Faster(x,z)
- Cheetah(Joe)
- Dog(Dave)
-  \( \Rightarrow \) Faster(Joe,Dave)
- Faster(Joe,Dave)
- Turtle(Steve)
-  \( \Rightarrow \) Faster(Dave,Steve)
-  \( \Rightarrow \) Faster(Joe,Steve)
- Faster(Dave,Steve)
- Faster(Joe,Steve)
**Backward Chaining**

- **Goal-Driver:** Start with a goal to be proved
  - i.e. IsCool(Joe)
- **Find rule which has our goal in its conclusion**
  - i.e. Name(Joe) => IsCool(Joe)
- **Check the premise of rule to satisfy the rule.**
  - i.e. Name(Joe)
- **Fail/Success** → **Finish**

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**Backward Chaining Algorithm**

- **Query** \( q \) is asked
- **BACKWARD-CHAIN(\( q \))**

   If a matching fact \( q' \) is known, return the unifier
   For each rule whose consequent \( q' \) matches \( q \)
   attempt to prove each premise of the rule by backward chaining

**Issues with Backward Chaining**

- Some added complications in keeping track of the unifiers
- More complications to help avoid infinite loops
- Two versions: Find any solution, find all solutions
**Backward Chaining Example**

- Cheetah(x) ^ Dog(y) => Faster(x,y)
- Friendly(y) ^ Furry(y) => Dog(y)
- Cheetah(Leo)
- Friendly(Shadow)
- Furry(Shadow)

![](image1.png)

**Backward Chaining Example**

2 (Fail)

- Cheetah(x) ^ Dog(y) => Faster(x,y)
- Friendly(y) ^ Furry(y) => Dog(y)
- Cheetah(Leo)
- Friendly(Shadow)
- Furry(Shadow)

![](image2.png)
Questions?