

CSC480 – Semantic Web Technologies

First Order Logic Examples

1. $\forall x (x < 0 \vee x = 0 \vee x > 0)$
2. $\exists x \forall y (\text{Female}(x) \wedge \text{Parent}(x, y))$
3. $\exists x \exists y \exists z (\text{Male}(x) \wedge (\text{Parent}(x, y) \wedge \text{Parent}(x, z) \wedge \neg(y = z))$
4. $\exists v \exists w \exists x \exists y \exists z (\text{Parent}(v, w) \wedge \text{Parent}(w, x) \wedge \text{Parent}(v, y) \wedge \text{Parent}(y, z))$
5. $\forall x (\text{Mushroom}(x) \wedge \text{Blue}(x)) \Rightarrow \neg \text{poisonous}(x)$

Description Logic Examples

(Note: \cap is intersection and \cup is union in the following examples)

1. $\text{Person} \cap \text{Female} \cap \exists \text{hasHusband} . (\text{Person} \cap \text{Male})$
2. $\text{Tree} \cap \geq 2 \text{ has_branch} \cap \forall \text{has_branch} . \text{BinaryTree}$
3. $\text{Male} \cap (\exists \text{married} . \text{Doctor}) \cap (\forall \text{hasChild} . (\text{Doctor} \cup \text{Professor}))$
4. $\text{HappyMan} \equiv \text{Man} \cap \exists \text{married} . \text{Doctor}$
5. $\text{receive.Scholarship} \equiv \text{Student} \cap \forall \text{hasMajor} . \text{CS} \cap \forall \geq 3 \text{ hasGPA}$

Solutions – First Order Logic Examples

1. For every x , x is either less than 0, equal to 0 or greater than 0
2. There exists an x such that for every y , x is a female and the parent of y \rightarrow every person has a female parent
3. There exists an x , y and z such that x is a male, x is the parent of y and z and y and z are different \rightarrow there is a man that has two children
4. There exists five people, such that v is the parent of w and y , w is the parent of x and y is the parent of z \rightarrow x and z are cousins
5. For all x , if x is a mushroom and blue, then it is not poisonous \rightarrow no blue mushroom is poisonous

Solutions - Description Logic Examples

1. A person that is female and has a husband that is male \rightarrow wife
2. There is a tree that has at least two branches and both branches are binary trees \rightarrow binary tree
3. There is a man that is married to a doctor and whose children are all either doctors or professors
4. A happy man is a man that is married to a doctor
5. A student that is a CS major with a GPA ≥ 3 will receive a scholarship