

## AI Tutorial-3

1. (i)  $\exists x (\text{mode of transport}(x) \wedge \neg \text{blizzard}(x)) \rightarrow \text{has}(\text{Mary}, x)$
- (ii)  $\forall x \neg (\text{living thing}(x) \wedge \neg \text{fr}(x)) \rightarrow \text{likes}(x, \text{thunder})$
- (iii)  $\exists x : \text{horse}(x) \rightarrow \neg \text{likes}(x, \text{hay})$
- (iv)  $\exists x : \text{bridge player}(x) \wedge \forall y \text{ knows rules}(x, y) \rightarrow \text{successful}(x)$
- (v)  $(\neg \text{accident}(\text{John}) \wedge \neg \text{sick}(\text{John})) \rightarrow \neg \text{need}(\text{John}, \text{doctor})$
- (vi)  $\exists x : (\text{professor}(x) \wedge \neg \text{historian}(x)) \rightarrow \text{writes}(x, \text{programs})$
- (vii)  $(\exists x : \text{chess piece}(x) \rightarrow \text{moves}(x, \text{diagonal})) \vee \neg \text{name}(\text{"Bobby Fischer"})$
- (ix)  $\forall x : \text{child}(x) \wedge \text{healthy}(x) \rightarrow \text{likes}(x, \text{icecream})$
- (x)  $\forall x : \text{bird}(x) \wedge \neg \text{penguin}(x) \wedge \neg \text{ostrich}(x) \wedge \neg \text{broken wing}(x) \rightarrow \text{fly}(x)$
- (xi)  $\exists x \exists y : (\text{block}(x) \wedge \neg \text{sphere}(y)) \rightarrow \text{place}(x, y)$
- (xii)  $\forall x \exists i (\text{tree}(x) \wedge \text{in}(x, \text{yard}(\text{Mary}))) \rightarrow \neg \text{has}(x, \text{leaves})$
- (xiii)  $\exists x : \text{block}(x) \wedge \text{paint}(x) \rightarrow \neg \text{change weight}(x)$
- (xiv)  $\exists x : \text{question}(x) \wedge \text{on}(x, \text{crypto final}) \rightarrow \text{hard}(x)$
- (xv)  $\exists x : \text{box}(x) \wedge \neg \text{on}(x, \text{conveyor belt}) \wedge \neg \text{marked}(x, \text{fragile})$   
 $\rightarrow \text{robot}(\text{robbie}) \wedge \text{move}(x, \text{warehouse}, \text{shipping dock}).$

2. (i) All people who shave themselves there are some barbers who don't shave these people.
- (ii) There are some barbers who shave only some people and on all rest shave themselves.
- (iii) For all those who are not a computer engineering student there are some barbers who do not shave these students.
- (iv) When all students are computer engineering students, at least two students are not computer engineering students.