Assignment No. 2

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Subject : IS LAB

DOP	DOA	Marks	Sign

(Q1)
1] Every child sees some witch no. witch has both a black cat and a pointed hat.
2] Every with is good or bad.
3] Every child who sees any good with gets candy
4] Every child that is bad has a black cat.
5] every child that is seen by any child has pointed hat.

→ A] Facts into FOL.
1) ∃ x ∀ y (child (x), witch (y) → sees(x,y))
∼∃ y (witch (y) → has(y, black cat ∧ has (y, pointed hat).
2) ∃ y (witch (y) → good (y) ∨ bad (y))
(y, pointed hat).
3) ∃x (sees (xy) → (witch (y) → good (y)) → get (x, candy).
4) ∃y (witch (y) → bad (y)) → has (y → black hat)).
5) ∃y (sees (x,y) → has (y, pointed hat)

B] FOL into CNF
1) ∃ x ∀ y (child (x), witch (y) → sees (x,y))
→ ∼∃y, (witch (y) → has (y, black cat).
→ ∼∃y (witch (y) → has (y, pointed hat)

2] ∀y (witch (y) → good(y))
∀y (witch (y) → bad (y)).
3] ∃x (bad(y) → has (y, black hats)
4] ∃y (seen (x,y) → has (y, pointed hat)]
5] ∼∀y (seen (x,y) → has (y, black hat)

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c) sees (x,y) — witch (y) v sees (x,y) {good v badly}

~ seen(x,(good) ∧ sees (x,bad) — has (y,z) {y, good v bad} {z / black cat v}

seen (x, good) v seen (x, bad) — has (god, pointed) hats v get (x, candy)

seen (x, good) v has (good pointed hat) v gets (x, candy) — seen (x, god) v gets (x, candy).

gets (x, candy)

2] example :-

→ 1) ∀x (boy (x) or girl(x) → child (x))

2) ∀ y (child (y) → gets (y, doll) or gets (y, train) or gets (y, coal)).

3] ∀ w (boy (w) → ! gets (w, doll))

4) For all z (child (z) and bad (z) → gets (z, candy)

∀y child (y) → ! gets (y, train).

5] child (ram) → gets (ram, coal)

CNF clauses :-

1) boy (x) or child (x)

! girl (x) or child (x)

2) ! child (y) or gets (y, doll) or gets (y, train) or gets (y, coal)

3) ! boy (w) or ! gets (w, doll)

4) ! child (z) or ! bad (z) or gets (z, coal)

5) ! child (ram) → gets (ram, coal)

6) bad (ram).

Q.2 Differentiate between STRIPS and ADL

Strips Language	ADL
① Only allow positive literals in the states for eg. : A Valid sentence is STRIPS is expressed as ⇒ Intelligent ∧ Beautiful	① Can support both positive & negative literals for eg. :- Same Sentence is expressed as ⇒ stupid ∧ ¬ugly
② STRIPS stands for standard Research Institute Problem Solver	② Stands for Actions Description Language
③ Makes use of closed world assumption (i.e.) un mentioned literals are false.	③ Makes use of open world Assumption (i.e.) unmentioned literals are unknown
④ We only can find ground literals in goals for eg. :- Intelligent ∧ Beautiful	④ We can find qualified variables in goal For eg. :- $\exists x\ At(P_1, x) \wedge At(P_2, x)$ is the goal of having P_1 & P_2 in the same place in e.g. of blocks
⑤ Goals are conjunctions for e.g. :- (Intelligent ∧ beautiful)	⑤ Goals may involves conjunction & disjunctions for e.g. :- (Intelligent ∧ (Beautiful ∧ Rich))

(6) Effects are conjunctions	(6) Conditional effects are allowed ∴ when P E. means E is an effect only if P is satisfied
(7) Does not support equality	(7) Equality predicate (X = Y) is build in.
(8) Does not have support for types	(8) Support for types for eg. : The variable P: person

Q.2) Differentiate between STRIPS and ADL.

→

	STRIPS language	ADL
1)	Only allows positive literals in the states.	Can support both positive & negative literals.
2)	STRIPS stand for standard Research Institute problem solver.	stands for action Description language.
3)	we only can find ground literals in goals.	we can find qualified Variables in goal.
4)	makes use of closed world assumption unmentioned literals are false.	makes use of open world assumption unmentioned literals are unknown.
5)	Goals are Conjunctions for eg: (intelligent ∧ beautiful)	Goals may involve conjunction for eg. (intelligent ∧ (beautiful ∧ rich)
6)	Does not support equality.	equality predicate $(x = y)$ is build in.

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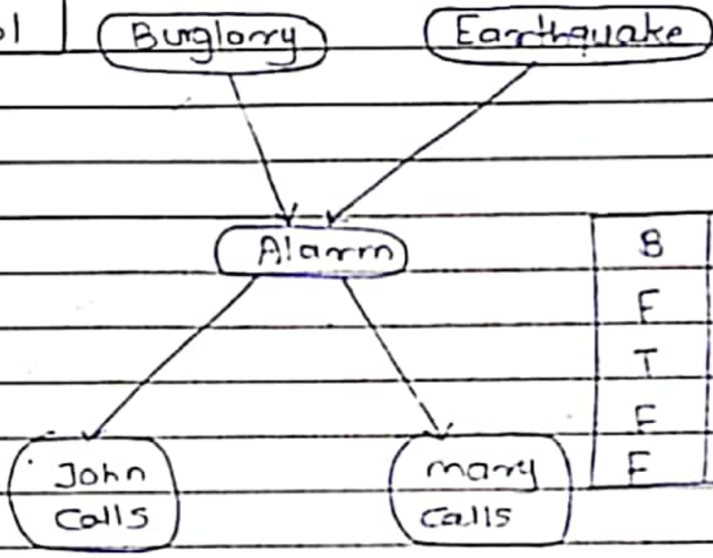
Q.4) You have two neighbours
→

P(B)
0.001

P(E)
0.002



B	E	P(A)
F	T	0.95
T	F	0.94
F	T	0.29
F	F	0.001

A	P(J)
T	0.09
F	0.05

A	P(M)
T	0.70
F	0.01

1) The topology of the n/w indicates that
- Burglary & earthquake affect the probability of the alarms going off.
- whether John & mary call depends alarm.
- They do not perceive any burglaries directly. They do not notice minor earthquakes & they do not confer before calling.

2) Mary listening to loud music & John confusing phone ringing to sound of alarm can be read from n/w only implicity as uncertainly associated to calling at work.

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3) The probability actually summarize potentially infinite sets of circumstances.

- The alarm might full to go off due to high humidity, Power failure, dead battery, cut wires, & dead mouse stuck inside the bell, etc.

4) The condition probability tables in n/w gives probability for Values of random Variables depending on comb^n of values for the parent nodes.

5) Each row must be sum to 1 because entries represents exhaustive set of Values for the Variables.

6) all Variables are boolean.

7) In general, a table for a boolean Variable with k parents contains 2^k ~~in~~ independently specific probabilities.

8) A Variable with no parents has only one row, representing prior probabilities of each possibility Value of the Variable.

9) every entry in ~~joint~~ full joint probability distribution can be calculated from info. in bayession n/w.

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10) A generic entry in joint distribution is probability of a conjuction of particular assignments to each variable $P(x_1 = x_1 \wedge \cdots \wedge x_n = x_n)$ abbreviated as $P(x_1, \cdots x_n)$

11) The value of this entry is $P(x_1, \cdots x_n) = \prod i=1, n\, P(1, \text{Parents}(xi))$, where parents s(xi) denotes the specific values of the variables parents (xi)

$- P(j \wedge m \wedge a \wedge b \wedge ne)$
$= P(j|a)\; P(m|a)\; P(a|nb \wedge ne)\; P(nb)\; e(ne)$
$= 0.09 \times 0.07 \times 0.001 \times 0.999 \times 0.998$
$= 0.000628$

12 Bayesian n/w: