TASGAONKAR GROUP

SARASWATI EDUCATION SOCIETY

Date :

Assignment No:- 02

Name:- Sainath Nagraj Patil

Roll No:- 48

Class:- B.E. I.T.

Sem:- VIII

Sub:- IS Lab

D.O.P	D.O.C	Marks	Sign

TASGAONKAR GROUP

SARASWATI EDUCATION SOCIETY

Date :

Q.1) Solve the following with forward chaining or backword chaining or resolution (any one). use predicate logic of language of knowledge representation clearly specify the facts & interance rule used

Q.1) Example 1:-

1) Every child sees some with No witch has both a black cat & a pointed het.
2) Every witch is good or bad.
3) Every child who sees any good witch gets candy.
4) Every witch that is bad has a black cat
5) Every witch that is seen by any child has a pointed hat.

→ A) Facts into fol

1) $\exists x \forall y$ (child (x), witch (y) → sees (x, y))
$\neg \exists y$ (witch (y) → has (y, black cat) ∧ has (y, pointed hat))

2) $\exists y$ (witch (y) → good (y) ∨ bad (y))

3) $\forall x$ ((sees (x, y) → (witch (y) → good (y)) → get (x, candy))

4) $\forall y$ ((witch (y) → bed (y)) → has (y → black hat))

5) $\forall y$ (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, Pointed hat))

2) ∀y (witch(y) → good(y))

∀y (witch(y) → bad(y))

3) ∃x [(sees(x, y) → witch(y) → good(y)) → gets [x, candy)

→ ∃x [(sees(x, good(y)) → gets(x, candy)]

4) ∃y [bad(y) → has(y, black hats)]

5) ∃y [seen(x, y) → has(y, pointed hat)]

→ ¬~~B~~∀y [seen(x, y) → has(y, black hat)]

c) Sees(x, y) witch(y) ∨ sees(x, y)

{good ∨ bad / y}

¬seen(x, (good) ∧ sees(x, bad) has(y, z) or

{y/good ∨ bad}

{z/black cat ∨ pointed hat)}

seen(x, good) ∨ seen(x, bad)

has (good, Pointed hats ∨ gets(x, Candy)

Seen(x, good) ∨ has (good pointed hat) ∨ get (x, Candy)

Seen(x, good) ∨ gets(x, Candy)

gets(x, Candy) gets(x, Candy)

TASGAONKAR GROUP

SARASWATI EDUCATION SOCIETY

Date :

2) Example 2 :-

1) Every boy or Girl is a child
2) Every Child gets a doll or a train or a lump of a Coal
3) No boy get any doll
4) Every child who is bad get any lump of Coal
5) No child gets a train
6) Ram gets lump of Coal
7) prove Ram is bad.

→ 1) ∀x (boy(x) or girl(x) → child(x))
2) ∀y (child(y) → gets(y, doll) or get(y, train) or gets(y, coal))
3) ∀w (boy(w) →) gets(w, doll)
4) for all z (child(z) and bad(z)) → gets(z, coal))
∀y child(y) →) gets(y, train)
5) child(ram) → get(ram, coal)
To prove (child(ram) → bad(ram))

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) gets(z, coal)

Scanned with CamScanner

Date :

Resolution:

4) !Child (z) or bad (z) or get (z, coal)

6) bad (ram)

7) !Child (ram) or gets (ram, coal)

Substituting z by ram.

1) (a) !boy (x) or Child (x)

boy (ram)

8) Child ram (substituting x by ram)

7) ! Child (ram) or gets (ram, coal)

8) child (ram)

9) gets (ram, coal)

2) ! Child (y) (or gets (y, doll) or gets (y, train) or gets (y, coal).

3) child (ram)

10) gets (ram, doll) or gets (ram, train) or gets (ram, coal)

(Substituting y by ram)

9) gets (ram, coal)

10) gets (ram, doll) or gets (ram, train) or gets (ram, coal)

11) get (ram, doll) or gets (ram, coal)

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

5) boy (ram)

12) ! get (ram, doll), substituting w by ram)

11) gets (ram, doll) or gets (ram train)

12) ! get (ram, doll)

13) get (ram, coal)

Scanned with CamScanner

Date :

13) gets (ram, coal)
6) (a) get (ram, coal)
13) gets (ram coal)
Hence, bad (ram) is proved.

Q.2) Different between STRIPS & ADL

STRIPS language	ADL
i) only allow positive literals in the states for eg: A vaild sentence is STRIPS is expressed as ⇒ Inteligent ∧ Beautiful	1) Can support both positive & negative literals for eg:- Same sentence is expressed as ⇒ Stupid ∧ ¬ugly
2) STRIPS Stand for Standard Research Institute problem solver	2) Stands for Action Description Language.
3) ~~We~~ Goals are conjunctions for eg:- (Intelligent ∧ Beautiful)	3) Goal may involve conjunctions & disjunctions for eg:- (Intelligent ∧ (Beautiful ∧ Rich))

Date :

4) Does not support equality	4) Equality predicate (x = y) is build in
5) Effects are conjunctions	5) Conditional effects are allowed
6) Does not have support for types	6) Support for types for eg:- The Variable 'P: Person

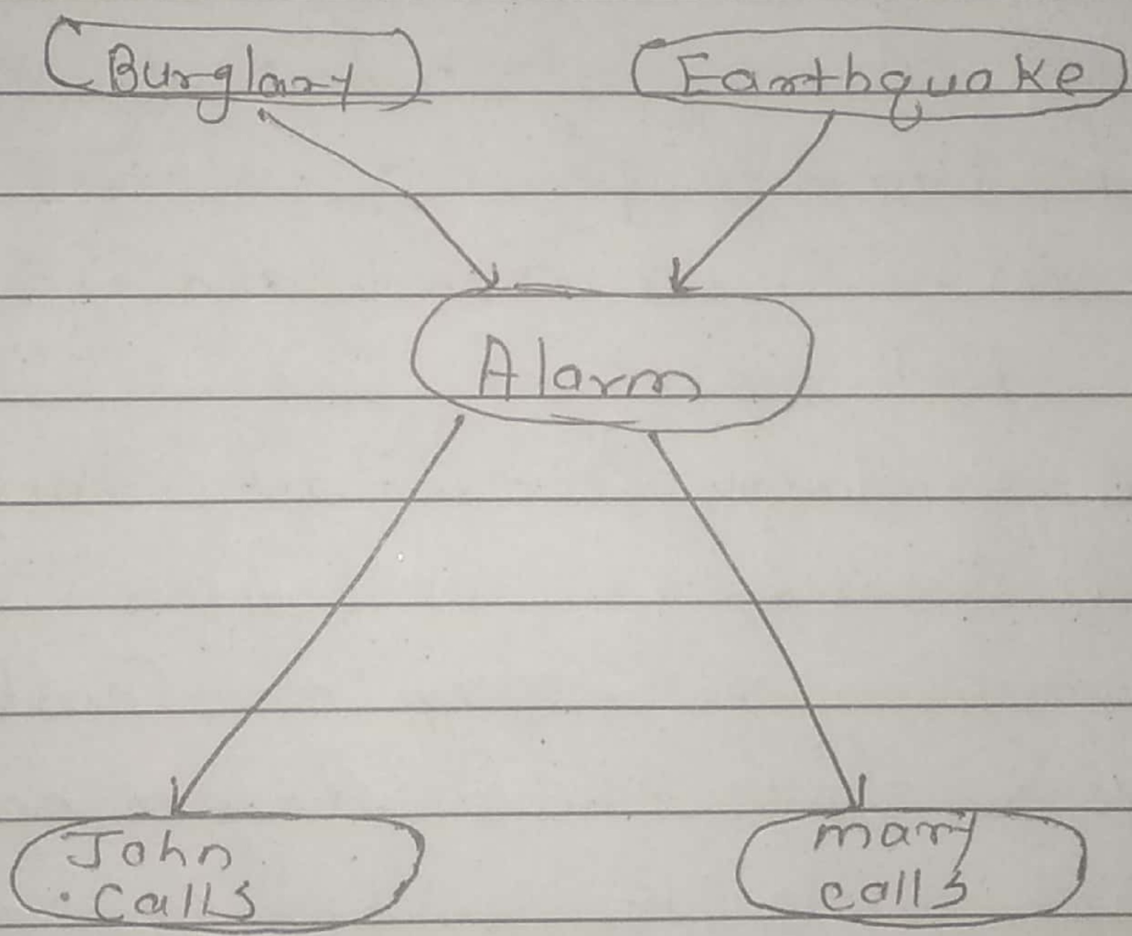
Date :

Q.4) You have two neighbors J and M, who have promised to call you at work when they here the alram. J always calls when he hears the alarm, but sometimes confused telephone ringing with alaram & call then too. M likes loud music & sometimes misses the alaram together. Draw a Bayesian network for this domain with suitable probability table.

→

P(B)
0.001

P(E)
0.002



A	P(J)
T	0.09
F	0.05

A	P(M)
T	0.70
F	0.01

TASGAONKAR GROUP

SARASWATI EDUCATION SOCIETY

Date :

1) Burglary & earthquake affect the probability of the alarm going off.
- Wheathe John & mary call depend only on alarm
2) Mary listening to loud music & John Confusing phone ringing to sound of alarm Can be read from network only implicitly of uncertainty associated to calling at work.
3) The Probability actually Summarize potentially infinite sets of Circumstances
- The alarm might fail to go off due to high humidity power failure, dead battery Cut wires, a dead mouse Stuck inside the bell, etc.
4) The Condition probability tables in n/w gives Probability for values of random Variables depending on Combination of Values for the parent nodes
5) Each row must be sum to 1 because entires represent exhaustive set of cases for Variable
6) All Variable are Boolean
7) In general, a table for a Boolean Variable with K parents Contains 2^K independently specific probabilities

TASGAONKAR GROUP

SARASWATI EDUCATION SOCIETY

Date :

8) Every entry in full joint probability distribution Can be Calculated from information in Bayession network.

9) A generic entry in joint distribution is Probability of a Conjunction of particular assignment to each variable $P(X_1 = x_1 \wedge \ldots \wedge X_n = x_n)$ abbreviated as $P(x_1, \ldots, x_n)$

10) The value of this entry is $P(x_1, \ldots, x_n) = \prod_{i=1,n} P(x_i \mid \text{Parents}(X_i))$, where parents$(x_i)$ denotes the specific value of the variables parents(X_i)

— $P(j \wedge m \wedge a \wedge \neg b \wedge \neg e)$

$= P(j|a)\, P(m|a)\, P(a|\neg b \wedge \neg e)\, P(\neg b)\, P(\neg e)$

$= 0.09 \times 0.07 \times 0.001 \times 0.999 \times 0.998$

$= 0.000628$

11) Bayesion Network