Machines and Intelligence: Assignment 2

Testing

Original rule set

Testing propagate method for father-is-parent rule and grandfather rule.

Facts given	Deductions	Rules tested
H7 father of H8 H8 father of E	H7 parent of H8 H8 parent of E H7 grandfather of E	Father-is-parent Grandfather

Extended rule set

Testing propagate method for my extended rule set.

Facts given	Deductions	Rules tested
H7 father of H8 H8 father of E	H7 parent of H8 H7 is male H8 parent of E H7 grandfather of E H8 is male	Father-is-parent Father-is-male Grandfather
Jill mother of Shula Shula mother of Pip	Jill parent of Shula Jill is female Shula parent of Pip Jill grandmother of Pip Shula is female	Mother-is-parent Mother-is-female Grandmother rule
Jill parent of David Jill parent of Shula	David sibling of Shula Shula sibling of David	Sibling
Jill parent of David Jill parent of Shula David is male Shula is female	David sibling of Shula Shula sibling of David David brother of Shula Shula sister of David	Sibling Brother Sister
David father of Pip Shula mother of Daniel Shula sister of David	David parent of Pip David is male Shula parent of Daniel Shula is female Shula aunty of Pip	Father-is-parent Father-is-male Mother-is-parent Mother-is-female Aunty
David father of Pip Shula mother of Daniel David brother Shula	David parent of Pip David is male Shula parent of Daniel Shula is female David uncle of Daniel	Father-is-parent Father-is-male Mother-is-parent Mother-is-female Uncle
David father of Pip Shula mother of Daniel David sibling of Shula	David parent of Pip David is male Shula parent of Daniel Shula is female David brother of Shula David uncle of Daniel Daniel cousin of Pip	Father-is-parent Father-is-male Mother-is-parent Mother-is-female brother Uncle cousin

David father of Pip **Shula mother of Daniel** **David sibling of Shula** **Daniel is male**	David parent of Pip David is male Shula parent of Daniel Shula is female David brother of Shula David uncle of Daniel Daniel cousin of Pip Daniel nephew of David	Father-is-parent Father-is-male Mother-is-parent Mother-is-female brother Uncle Cousin Nephew
David father of Pip **Shula mother of Daniel** **Shula sibling of David** **Pip is female**	David parent of Pip David is male Shula parent of Daniel Shula is female Shula sister of David Shula aunty of Pip Pip cousin of Daniel Pip niece of Shula	Father-is-parent Father-is-male Mother-is-parent Mother-is-female Sister Aunty Cousin Niece

Extended Rule Set

Rule	Antecedents	Consequences	Successors
Aunty	?p parent of ?m ?a sister of ?p	?a aunty of ?m	None
Uncle	?p parent of ?m ?a brother of ?p	?a uncle of ?m	None
Nephew	?p parent of ?n ?au sibling of ?p	?n nephew of ?au	None
Niece	p parent of ?n ?au sibling of ?p ?n is female	?n niece of ?au	None
Cousin	au parent of ?c ?md sibling of ?au ?md parent of ?m	?c cousin of ?m	None
Sister	?s sibling of ?sa ?s is female	?s sister of ?sa	Aunty
Brother	?s sibling of ?sa ?s is male	?s brother of ?sa	Uncle
Sibling	?p parent of ?ba ?p parent of ?bb	?ba sibling of ?bb	Sister Brother Cousin Nephew Niece
grandfather	?gf father of ?p ?p parent of ?c	?gf grandfather of ?c	None
Father-is-parent	?f father of ?c	?f parent of ?c	Grandfather Grandmother Sibling Cousin Aunty Uncle Nephew Niece
grandmother	?gm mother of ?p ?p parent of ?c	?gm grandmother of ?c	None
Mother-is-parent	?f mother of ?c	?f parent of ?c	Grandmother Grandfather Sibling Cousin Aunty Uncle Nephew Niece
Mother-is-female	?f mother of ?c	?f is female	Sister Niece
Father-is-male	?f father of ?c	?f is male	Brother Nephew

Results

Facts given	Deductions (Rule nets)	Deductions (forward chaining)
Jill mother of David Jill mother of Shula David father of Pip Shula mother of Daniel	Jill parent of David Jill is female Jill parent of Shula David sibling of Shula Shula sibling of David Jill is female David parent of Pip Jill grandmother of Pip David is male David brother of Shula Shula parent of Daniel Jill grandmother of Daniel Daniel cousin of Pip Pip cousin of Daniel David uncle of Daniel Shula is female Shula sister of David Shula aunty of Pip	Jill parent of David Jill parent of Shula David parent of Pip Shula parent of Daniel David sibling of David David sibling of Shula Shula sibling of David Shula cousin of David Pip cousin of David Daniel cousin of David Shula sibling of Shula Shula cousin of Shula Pip cousin of Shula Daniel cousin of Shula Jill grandmother of Pip Pip sibling of Pip Pip cousin of Pip Pip cousin of ?m Shula cousin of Pip Daniel cousin of Pip Pip nephew of Shula Pip niece of Shula Jill grandmother of Daniel Daniel sibling of Daniel Daniel cousin of ?m Shula cousin of Daniel Pip cousin of Daniel Daniel cousin of Daniel Daniel nephew of Shula Daniel niece of Shula

Rule nets	Forward chaining
1st run: 31 ms	**1st run:** 47 ms
2nd run: 31 ms	**2nd run:** 63 ms
3rd run: 41 ms	**3rd run:** 78 ms
4th run: 31 ms	**4th run:** 47 ms
5th run: 47 ms	**5th run:** 47 ms
Average: 36.2 ms	**Average:** 56.4 ms