SMU - Learning From Entailment

by José Ananías Hilario Reyes

i.

$\gamma_1 = \neg p(X, Y, f(Z)) \vee q(W)$

$\gamma_2 = \neg p(\text{marco}, \text{polo}, f(\text{boat})) \vee q(\text{lagoons}) \vee r(\text{sunny})$

$\ell gg(\gamma_1, \gamma_2) = \neg p(X_1, X_2, f(X_3)) \vee q(X_4)$

$\gamma_3 = \neg p(\text{drake}, \text{lawrence}, f(\text{camel})) \vee q(\text{desert})$

$\ell gg(\ell gg(\gamma_1, \gamma_2), \gamma_3) = \neg p(X_5, X_6, f(X_7)) \vee q(X_8)$

Terms	Substitution
(X, marco)	X_1
(Y, polo)	X_2
(Z, boat)	X_3
$(W, \text{lagoons})$	X_4
(X_1, drake)	X_5
$(X_2, \text{lawrence})$	X_6
(X_3, camel)	X_7
(X_4, desert)	X_8

ii.

$\gamma_1 = \neg\text{goesByVehicle}(\text{car}, \text{ownerOf}(\text{car})) \lor \text{environmentalist}(\text{adam}) \lor$
$\text{physicallyActive}(\text{age}(\text{adam}), \text{sex}(\text{adam}), \text{athlete}(\text{adam})) \lor \text{married}(\text{adam}, \text{eve})$

$\gamma_2 = \neg\text{goesByVehicle}(\text{bicycle}, \text{ownerOf}(\text{bicycle})) \lor \text{environmentalist}(\text{david}) \lor$
$\text{environmentalist}(\text{sophie}) \lor \text{physicallyActive}(\text{age}(\text{david}), \text{sex}(\text{david}), \text{athlete}(\text{david})) \lor$
$\text{married}(\text{david}, \text{sophie}) \lor \text{physicallyActive}(\text{age}(\text{sophie}), \text{sex}(\text{sophie}), \text{athlete}(\text{sophie}))$

$\ell gg(\gamma_1, \gamma_2) = \neg\text{goesByVehicle}(X_1, \text{ownerOf}(X_1)) \lor \text{environmentalist}(X_2) \lor$
$\text{environmentalist}(X_4) \lor \text{physicallyActive}(\text{age}(X_2), \text{sex}(X_2), \text{athlete}(X_2)) \lor$
$\text{physicallyActive}(\text{age}(X_4), \text{sex}(X_4), \text{athlete}(X_4)) \lor \text{married}(X_2, X_3)$

Terms	Substitution
(car, bicycle)	X_1
(adam, david)	X_2
(eve, sophia)	X_3
(adam, sophie)	X_4

Proof of reducibility

$\ell gg(\gamma_1, \gamma_2) = \neg\text{goesByVehicle}(X_1, \text{ownerOf}(X_1)) \lor \text{environmentalist}(X_2) \lor$
$\text{environmentalist}(X_4) \lor \text{physicallyActive}(\text{age}(X_2), \text{sex}(X_2), \text{athlete}(X_2)) \lor$
$\text{physicallyActive}(\text{age}(X_4), \text{sex}(X_4), \text{athlete}(X_4)) \lor \text{married}(X_2, X_3)$

$\ell gg(\gamma_1, \gamma_2)' = \ell gg(\gamma_1, \gamma_2) \setminus$
$\{\text{environmentalist}(X_4), \text{physicallyActive}(\text{age}(X_4), \text{sex}(X_4), \text{athlete}(X_4))\}$

$\theta = \{X_4 \rightarrow X_2\}, \ \gamma_3 = \ell gg(\gamma_1, \gamma_2)$

$\gamma_3\theta = \ell gg(\gamma_1, \gamma_2)' = \neg\text{goesByVehicle}(X_1, \text{ownerOf}(X_1)) \lor \text{environmentalist}(X_2) \lor$
$\text{physicallyActive}(\text{age}(X_2), \text{sex}(X_2), \text{athlete}(X_2)) \lor \text{married}(X_2, X_3)$