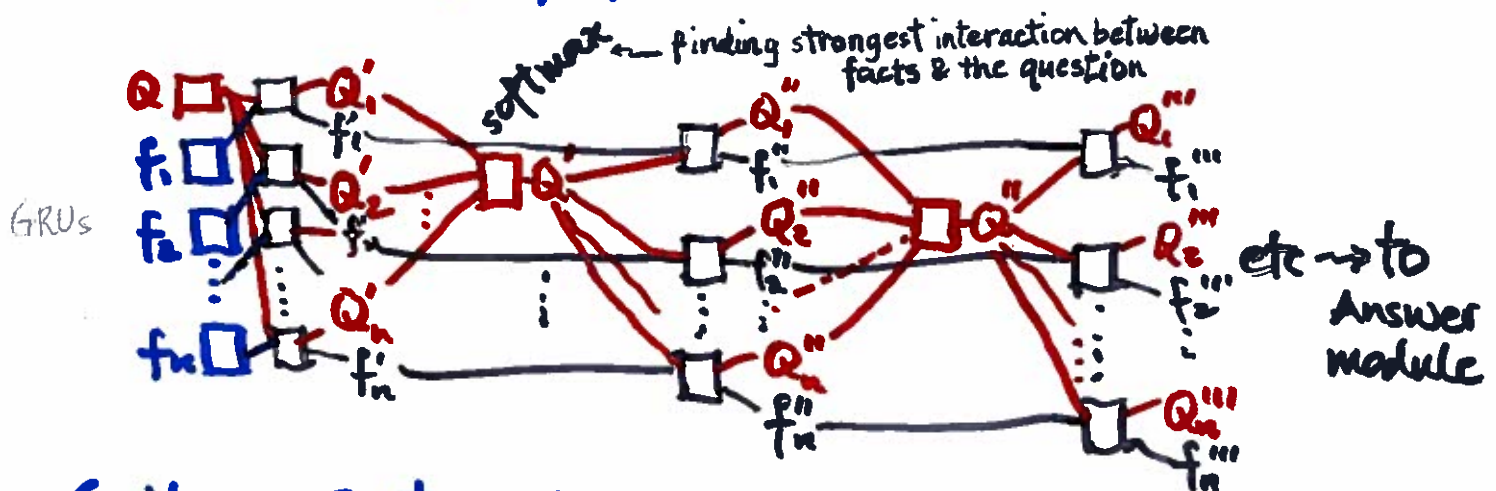


Peng et al., Towards NN-based reasoning

1. The office is east of the hallway
2. The kitchen is north of the office
3. The garden is west of the bedroom
4. The office is west of the garden
5. The bathroom is north of the garden

KB
H O G B

How do you go from the kitchen to the garden?
South, east (by 2, 4)



Guilame-Bert et al., First-order Logic Learning

(A) From examples and non-examples of

$$P(x, f(x)) \wedge Q(g(x)) \Rightarrow R(h(f(x))) \quad (\text{numerically encoded})$$

(where pos^{ve} examples have $x \in \{a, b, c, \dots\}$) learn this rule.

(B) White king & white rook vs black king on chess board; is any piece under attack? (logically coded)

(C) 10 toy trains with up to 4 cars, each carrying up to 3 objects. 5 are going east & 5 are going west. Learn from 9 trains at a time, test on the 10th. Full success
Conventional NN units & arithmetic units are used.