

CS365  
Homework 2-Paper Summary  
*Paper- Learning Qualitative Models by Demonstration*

Gaganpreet Singh  
10258

February 26, 2013

## 1 Summary

The authors use a previously developed theory 'Qualitative Process Theory' [2] which is useful for giving a qualitative representation of quantities in terms of inequalities. They define a quantitative model as a directed acyclic graph of influences between quantities conditioned by active processes that drive change [3]. They then use this model to guide the behavior of a player (Playing Freeciv) through demonstration.

Their work and objectives are summarized below:

- Decomposing goals into subgoals and finding the shortest path from a legal action to the goal using back propagation. [1]
- During the demonstration of the game, learn the user's motivation in taking an action, the causes behind game events, quantity changes that happen due to actions within a turn, and across turns and thus construct a qualitative model. [3]
- Learn direct and indirect qualitative influences using Quantitative Process theory and Microtheory Inheritance. [3]
- Learn to reach legal actions using hierarchical task network [3]
- Learning quantitative relations through three sub tasks: Identifying the independent variable, identifying the dependent variable, and incrementally inducing the function. [3]

## 2 Main Contributions

- The demonstrator channelizes the learning so that the learner is not randomly exploring the game. [3]. This leads to better performance.
- Learning new qualitative influences and quantitative relationships can lead to formation of better strategies. [3]

## References

- [1] D Bryce and S Kambhampati. A tutorial on planning graph based reachability heuristics. 2007.
- [2] K D Forbus. Qualitative process theory. 1984.
- [3] Thomas R. Hinrichs and Kenneth D. Forbus. Learning qualitative models by demonstration. 2012.