

## I. IDENTIFICATION DATA

<b>Thesis title:</b>	Markov Logic Networks with Complex Weights and Algorithms to Train Them
<b>Author's name:</b>	Jan Tóth
<b>Type of thesis :</b>	master
<b>Faculty/Institute:</b>	Faculty of Electrical Engineering (FEE)
<b>Department:</b>	Department of Computer Science
<b>Thesis reviewer:</b>	Timothy van Bremen
<b>Reviewer's department:</b>	Department of Computer Science, KU Leuven, Belgium

## II. EVALUATION OF INDIVIDUAL CRITERIA

<b>Assignment</b>	challenging
<i>How demanding was the assigned project?</i>	
This project deals with the implementation of marginal inference and weight learning algorithms for complex Markov logic networks (MLNs), a relatively recent formalism for combining first-order logic with uncertainty. The project is not an easy one, given the relatively limited literature on complex MLNs (although more is available on "classical" MLNs), as well as the technical sophistication of some of the concepts underpinning them.	

<b>Fulfilment of assignment</b>	fulfilled
<i>How well does the thesis fulfil the assigned task? Have the primary goals been achieved? Which assigned tasks have been incompletely covered, and which parts of the thesis are overextended? Justify your answer.</i>	
The thesis proposes an implementation of Gibbs sampling for marginal inference adapted to the complex MLN setting. Similarly, parameter learning algorithms for maximum likelihood estimation are proposed: one using gradient descent, and another taking advantage of the complex domain using the discrete Fourier transform. The thesis therefore seems to fulfil the assigned tasks.	

<b>Methodology</b>	outstanding
<i>Comment on the correctness of the approach and/or the solution methods.</i>	
The methodology is well laid-out and logical. One minor point for improvement is that it might have been nice to see some more background information on inference and learning in classical MLNs, before extending this to the complex case.	

<b>Technical level</b>	A - excellent.
<i>Is the thesis technically sound? How well did the student employ expertise in the field of his/her field of study? Does the student explain clearly what he/she has done?</i>	
Although I was not able to follow all of the details, at a high level the approaches proposed in the thesis seemed to be technically sound and made use of many sophisticated technical concepts and tools (e.g. gradient descent in the complex domain, the discrete Fourier transform, a good understanding of the semantics of first-order logic, etc.).	

<b>Formal and language level, scope of thesis</b>	B - very good.
<i>Are formalisms and notations used properly? Is the thesis organized in a logical way? Is the thesis sufficiently extensive? Is the thesis well-presented? Is the language clear and understandable? Is the English satisfactory?</i>	
The text was mostly well-written and clear. However, I would have preferred to see some more intuition (e.g. more running examples) in some places, especially as the notation is quite heavy and at times difficult to follow.	

<b>Selection of sources, citation correctness</b>	A - excellent.
<i>Does the thesis make adequate reference to earlier work on the topic? Was the selection of sources adequate? Is the student's original work clearly distinguished from earlier work in the field? Do the bibliographic citations meet the</i>	



## THESIS REVIEWER'S REPORT

standards?

The thesis seems to reference appropriate sources. The recentness of complex MLNs as a statistical-relational model mean that there has not been much (if any) work geared towards them specifically, but related papers appear to be correctly cited.

### Additional commentary and evaluation (optional)

*Comment on the overall quality of the thesis, its novelty and its impact on the field, its strengths and weaknesses, the utility of the solution that is presented, the theoretical/formal level, the student's skillfulness, etc.*

Overall I thought this was a good thesis. Along with the remarks already given above, my only other criticism would be that the thesis perhaps tries to do a bit too much, with various (sub)procedures proposed for inference and learning in a model that is quite new and already quite a bit more complex (no pun intended) than classical MLNs. In my view it might have been better to limit the scope somewhat while instead going for a more detailed exposition. In this sense I think it's probably not a bad thing that structure learning was not covered. In any case, nice work!

### III. OVERALL EVALUATION, QUESTIONS FOR THE PRESENTATION AND DEFENSE OF THE THESIS, SUGGESTED GRADE

*Summarize your opinion on the thesis and explain your final grading. Pose questions that should be answered during the presentation and defense of the student's work.*

The grade that I award for the thesis is .

Date:

Signature: 