Australian National University

INDEPENDENT STUDY CONTRACT

Note: Enrolment is subject to approval by the projects co-ordinator

SECTION A (Students and Supervisors)

UniID: u6958577

SURNAME: Wu FIRST NAME: Ying Xian

PROJECT SUPERVISOR (*may be external*): Songtuan Lin

COURSE SUPERVISOR (*a SOC academic*): Pascal Bercher

COURSE CODE, TITLE AND UNIT: COMP4550, Advanced Computing Research Project, 24

SEMESTER ☒ S1 ☒ S2 YEAR: 2022

PROJECT TITLE:

Transforming Partially Ordered HTN Planning Problems to Totally Ordered Problems

LEARNING OBJECTIVES:

1) Fully understand the Hierarchical Task Network (HTN) planning paradigm as a prerequisite to understand and implement encding techniques that turn a given HTN problem into an alternative one such that a certain set of properties are maintained.
2) Learn how to extend an existing large-scale C++ software system (an HTN planning system with additional capabilities) to incorporate additional functionality.
3) Be able to evaluate planning systems based on relevant metrics like run time, size, and performance, and also evaluate statistical data for the implemented technique like the size of resulting models, etc.

PROJECT DESCRIPTION:

The goal of this project is to investigate techniques that turn a partially ordered (PO) HTN planning problem into a totally ordered (TO) one without sacrificing properties such as preserving the set of solutions (i.e., completely), preserving the set of optimal solutions (where we could consider different levels, e.g., preserving all optimal solutions, or at least some of them, or the more the better), and preserving at least one solution.

It will also be identified whether there are special cases where the transformation is guaranteed to have these properties.

To this end, the algorithm by Dr. Gregor Behnke for converting PO HTN problems to TO HTN problems will be re-implemented in C++, using the PANDA-PI framework (an HTN planning system by Behnke et al. Augmented by several additional features like compilation techniques). It will serve as comparison to attempted improvements, possibly by building on the existing one, otherwise by incorporating related ideas from the literature.

Finally, empirical evaluation of statistical properties such as compilation time, model size comparisons, etc, and run-time comparison of PO planner on PO domain vs. the same planner on the TO variant and run-time of the best-performing PO planner on the PO domains vs. the best TO planners on the resulting domains.

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ASSESSMENT (as per course's project rules web page, with the differences noted below):

Assessed project components:	% of mark	Due date	Evaluated by:
Thesis	(85%)	Oct 20th 2022	
Presentation	(10%)	Oct 27th 2022	
Critical Feedback	(5%)	1st Nov 2022	

MEETING DATES (IF KNOWN):

STUDENT DECLARATION:
I agree to fulfil the above defined contract

…….. ……..
Signature Date

SECTION B (Supervisor):

I am willing to supervise and support this project. I have checked the student's academic record and believe this student can complete the project. I nominate the following reviewers and have obtained their consent to review the completed thesis (through signature or attached email)

…….. ……..
Signature Date

Reviewer 1:
Name: Alban Grastien…….. Signature…….

Reviewer 2:
Name: Adam Piggott..…….. Signature…….

*Nominated reviewers (one has to be an SOC academic) may be subject to change on request by the supervisor.

REQUIRED DEPARTMENT RESOURCES:

SECTION C (Course coordinator approval)

…….. ……..
Signature Date

SECTION D (Projects coordinator approval)

…….. ……..
Signature Date