

# Combinatorial Optimization Project:

## The Traveling Salesman Problem (TSP) #3

Professor: Michaël Poss

Due date: 8<sup>th</sup> of May, 2017

April 16, 2017

The TSP is a well-known combinatorial optimization problem that requires a salesman to visit a set of cities in a way that minimizes total traveling distance. The key restriction of the problem is that each city should be visited exactly once and the trip has to finish at the starting city.

Several integer programming (IP) formulations for solving the TSP are available in the literature. In this project, you will study three IP formulations, described in Punnen (2007):

- The formulation proposed by Miller, Tucker, and Zemlin [595]. You need to combine constraints (1) with the assignment constraints on page 16;
- The formulation proposed by Claus [202]. You need to combine constraints (26)-(32) with the assignment constraints on page 16;
- The formulation proposed by Finke, Claus, and Gunn [291]. You need to combine constraints (14)-(21) with the assignment constraints on page 16.

For this project:

- You must implement these formulations in Julia language combined with JuMP package.
- You must prepare a project report written in L<sup>A</sup>T<sub>E</sub>X. In this report you should describe the mathematical formulations referenced above (explaining the meaning of each variable and constraint set), describe the computational experiments, and discuss the results;
- You must send the report and code to guillaume.duvillie@ulb.ac.be and leave a physical copy at the *Secrétariat des Étudiants du Département d'Informatique* at the 8th floor of the NO building, by 8<sup>th</sup> of May.

Practical informations:

- the ease of use (read/write on the standard input, options, CLI, etc) is taken into consideration in the grading,
- the performance of the implementation is also taken into consideration in the grading.

## References

Punnen A.P. (2007) "The traveling salesman problem: Applications, formulations and variations." The traveling salesman problem and its variations. Springer US, 1–28