Czech Technical University in Prague
Faculty of Electrical Engineering

Department of Cybernetics

DIPLOMA THESIS ASSIGNMENT

Student: Bc. Pavel T r u t m a n

Study programme: Cybernetics and Robotics

Specialisation: Robotics

Title of Diploma Thesis: Semidefinite Programming for Geometric Problems in Computer Vision

Guidelines:

1. Review the state of the art in semidefinite programming [1,2,3] and its use for solving variations of so called minimal problems in computer vision [4,5].
2. Suggest and develop a semidefinite solver for solving a variation of minimal problems.
3. Implement the solver, choose a relevant computer vision problem and investigate the performance of the solver in comparison to standard algebraic methods for solving the problem.

Bibliography/Sources:

[1] Y. Nesterov. Introductory lectures on convex optimization. Kluwer Academic Press, 2004.
[2] M. Laurent. SUMS OF SQUARES, MOMENT MATRICES AND OPTIMIZATION OVER POLYNOMIALS (http://homepages.cwi.nl/~monique/files/moment-ima-update-new.pdf).
[3] M. Laurent and P. Rostalski. The Approach of Moments for Polynomial Equations. In Handbook on Semidefinite, Conic and Polynomial Optimization, M. F. Anjos, J. B. Lasserre, eds., Springer 2012.
[4] C. Aholt, S. Agarwal, R. Thomas. A QCQP Approach to Triangulation, Computer Vision – ECCV 2012, Lecture Notes in Computer Science 7572 (2012), 654-667.
[5] F. Kahl, D. Henrion. Globally Optimal Estimates for Geometric Reconstruction Problems. ICCV 2005, (http://www2.maths.lth.se/vision/publdb/reports/pdf/kahl-henrion-ijcv-07.pdf).

Diploma Thesis Supervisor: Ing. Tomáš Pajdla, Ph.D.

Valid until: the end of the summer semester of academic year 2017/2018

L.S.

prof. Dr. Ing. Jan Kybic
Head of Department

prof. Ing. Pavel Ripka, CSc.
Dean

Prague, January 6, 2017