MatPlanWDM: An Educational Open-source Tool for Communication Networks Planning Courses

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Abstract

This poster presents MatPlanWDM tool and its application as an educational resource in Communication Networks Planning courses in the Technical University of Cartagena (Spain), MatPlanWDM is implemented as a MATLAB toolbox, together with a Graphical User Interface. It is devoted to the network planning of Wavelength-Routed (WR) optical Wavelength Division Multiplexing (WDM) networks. The tool includes a built-in heuristic algorithm and two solvers to obtain the optimum planning solution in small topologies. MatPlanWDM is designed to assist the student in the definition and a comparative evaluation of its original network planning algorithms. The software can be publicly downloaded at the MatPlanWDM site.

Background: Optical Network Optimization

GIVEN: NODES, OPTICAL FIBER LINKS, TRAFFIC BETWEEN NODES AND OTHER TECHNOLOGICAL CONSTRAINTS

WE OBTAIN: CAPACITY OF THE FIBER LINKS, NUMBER OF O/E RANCEIVERS AND OTHER NETWORK CONFIGURATION OPTIONS

Motivation

PLANNING ALGORITHM [1]

DESIGN OF ALTERNATIVE HEURISTIC ALGORITHMS

PLANING PROBLEMS ARE COMMONLY DIFFICULT TO SOLVE (NP-COMPLEXITY)

USEFUL FOR SELF-EVALUATION

IT GIVES US AN ASSESSMENT METHOD: STUDENTS CREATE THEIR OWN ALGORITHMS AND COMPETE "THE BEST ALGORITHM, THE BEST MARK"

Learning Experience

• "Planificación Avanzada de Redes de Comunicaciones" (5th year, "Ingeniero de Telecomunicación", Technical University of Cartagena, UPCT, Spain)
• "Telecommunication networks" (4th semester, Master of Science in Information and communication technology, FIR, University of Zagreb, Croatia)
• "Optimization and planning in optical networks" (BONE Master School, BONE Network of Excellence of the 7th Framework Program of the EU [4])
• And in 2 years: "Planificación y Gestión de Redes" (1st year, "Grado en Ingeniería Térmica", Technical University of Cartagena, UPCT, Spain)

Students' Feedback

STUDENTS FEEL STIMULATED LIVING THE ASSESSMENT AS A CONTEST
TECHNICAL DEPTH OF THE PROPOSALS ARE SURPRISINGLY HIGH
SOME PROPOSALS ARE NOW INTEGRATED IN MATPLANWDM
STUDENTS CAN USE ALGORITHMS OF OTHER STUDENTS

Conclusions

This poster presents MatPlanWDM network planning tool, focusing on its utilization in Communication Networks Planning courses in the Technical University of Cartagena (Spain). The tool is a valuable resource to support the teaching of the planning methodology. Students are provided with example heuristics, which serve as starting points to devise their own ones. Moreover, example algorithms and a built-in optimum solver become a good reference for performance comparison. MatPlanWDM also promotes student motivation, benefiting the achievement of the instructional objectives of the course.

References