

NCKU TEAM WINS 3rd PRIZE IN INFORMS RAS COMPETITION

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A research team led by Associate Prof. I-Lin Wang of Department of Industrial and Information Management at National Cheng Kung University (NCKU), Tainan, Taiwan, has won the 3rd prize in the 2010 Problem Solving Competition held by Railway Application Section (RAS), Institute for Operations Research and the Management Sciences (INFORMS), United States.

The purpose of this competition is to draw the public attention by offering high-value awards, USD\$5,000 in a total of 35 teams registered for the 2011 competition and

12 of them, mostly composed of professors or doctoral students from several renowned universities worldwide, including Massachusetts Institute of Technology, U.S., have submitted their final reports.



The competition problem, a hard train design optimization problem, seeks an optimal train routing and block-to-train assignment (BTA). In particular, each block carries cargo of the same origin and destination and may be shipped by trains or penalized for not being shipped. While blocks are to be routed by trains, the length, weight and number of blocks to be shipped for a train is limited by some operational regulations. A block may be swapped in some intermediate stations, yet the number of swaps for each block, as well as for each station, is limited. Furthermore, the imbalance of crews and trains has to be considered at the same time.

Prof. Wang and his team members spent about one and a half month to come up with a novel solution to this problem. They tried to generate sets of good train routes, and then calculated the best block swapping plan by a mathematical programming model. They then tried to iteratively generate new sets of block routes and associated train routes and designed best block swapping plans, until the solution emerged.

Their method is effective and efficient so that they can calculate a good solution within minutes for problems that may take hours or days to be solved by conventional methods. Even better, their method can easily incorporate existing good routes that may be reserved by professional experiences.

The NCKU team includes Associate Prof. I-Lin Wang and master program students Yu-Ting Liang, and Hung-Yi Lee. Both students are currently the first year student in the master's program of Department of Industrial and Information Management.

The Institute for Operations Research and the Management Sciences (INFORMS), established in 1995, is the largest professional society in the world for professionals in the fields of operations research (OR), management science (MS), and business analytics.

The judge team selected 4 teams in the final list. The Universidad de Los Andes from Colombia, Università degli Studi di Milano from Italy, and NCKU from Taiwan are the top 3 teams, while a team by National University of Singapore from Singapore and Southwest Jiaotong University from China receives the Honorable Mentions.