University of KwaZulu-Natal
School of Mathematics, Statistics & Computer Science
1st Semester 2016 Session

COMP 719 - Optimization and Modeling

Mini Project

Due Date: May 27, 2016

General Instruction:

i. This is a practical as well as research project. You might need to do some further review of the subject area, if that will help with your implementation and write up.

ii. Hard copies of all codes (programs), input data and final output must be submitted on or before the due date to the Admin Office (those in PMB are to send to Bev) latest by 4.00pm.

iii. Electronic copies of all codes (programs), input data and output (including intermediate results from experiments and graph, where necessary) must be put together as a zipped file and submitted via the submission link on module site.

iv. A new article (similar to a journal article to be approved) but titled **"A comparative studies of various heuristics for XYZ" (XYZ depends on your choice problem/paper"** must be written strictly in IEEE/ACM format. The main thrust of the paper is to present the comparative results you got from your experience along with that obtained in the original paper. Your article must be submitted both in hard and soft copy with the other deliverables.

v. **The mini-project can be done in group of NOT MORE THAN THREE but individual work better encouraged**. Where the work is done in group, the article and codes must provide the names and student number of all authors. At the end of the article, a short biography of the authors must be provided.

vi. ***Do not treat the June 5th as the deadline in case you have problem, give yourself one week earlier.***

vii. **What you need to submit**

   a. You need to submit hard copy of your work to the admin office.
   b. You need to submit ALL the source code (ready for test running)
   c. You need to submit ALL sample input and output printout.
   d. A report in form of an article as stated above.

Background

You are expected to work with **ONE of the articles (to be approved) from your Research Assignment.** However, this mini-project take the scope of the work further in terms of implementation, dataset to use and results generation. You possible aim at not only attempting what was done in the paper but also take it further. For example, you might attempt to use or generate more data set and improve given models and/or algorithms or seek better results..

Problem

Each group individual is to study their **approved** paper with the aims of understanding 1) the problem definition, 2) modeling (and possible improvement), 3) the optimization technique(s) used,

and 4) dataset used or how it was generated. The main objective of this project is to seek better solutions to the problem than what was obtained in the paper.

You duties are highlighted as follows:

1. Study the **selected** and **approved** journal article as in the programming assignment 1 above to understand the modeling of the problem, benchmark data and techniques used to solve it.
2. Select and implement **at least TWO population-based techniques** of your own (not limited to those taught in the class e.g. e.g GA, ACO, Bees, PSO, Glow-worm, Bacteria foraging, firefly, etc.)) to solve the same problem using the same data set. You can make similar or different assumptions as in the journal paper.
3. Select and implement **at least ONE local search techniques** (might be the same or different used in your previous assignments) to solve the same problem using the same data set. You can make similar or different assumptions as in the journal paper. Note that a replication of the techniques used in the paper is allowed provided you are able to provide an improvement of such techniques that give better results.
4. You should seek to implement your chosen heuristics with all necessary parameter control, improvement in order to seek, if possible, better results than that obtained in the paper.
5. Attempts to find some hybrids of the techniques in Nos. 2 and 3 (in addition to their implementation) in order to have algorithms that compete well and give better results where possible than the individual techniques and that obtained in the original paper.
6. Write a comprehensive technical article to report your results and compare them with that obtained in the original article. The article must be strong and technically sound as that of the original paper and at least 6 pages long in IEEE format.

Important Notes:

1. Part of the assessment criterion for this mini-project is your ability and attempt to device possible improved heuristics by hybridizing chosen heuristic with any of the Authors' or your chosen techniques and/or any other local search (e.g. GRASP, Scatter Search, etc.) or population-based techniques. This must be with the goal of seeking results that compete well and better than that obtained in the paper.
2. You are free to revise and improve your algorithms, if and where necessary. All parameter controls, setting, hybridization ideas and modification adopted must be FULLY documented and explained in the article you are to write.
3. You are free to read similar articles to that of your approved paper for literature review purpose (and to help with your writeup of related work).
4. Your implementation must be tested with the same dataset(s) as used in your chosen paper (or the same way they generated their dataset(s)). **The use of more datasets and generation of interesting results than that obtained in the paper will earn you extra marks.**

PS: You may wish to do this mini project in group of not more than 3 students. However, each group must select 2 of the research paper topics to work with among the three individuals in the group. Each group or individual should send their details (student name, number and chosen papers (in case of group from which I will approve ONE)) to me latest May 2nd for record purpose.

Expected submissions (as a zip file):

1. The original journal article
2. Complete working code, dataset used, intermediate and final results, graphs and other plots.
3. Technical report of your work.
4. Any other supplementary materials.

Marking Criteria

1. Background

Clear understanding and definition of the problem, via literature survey and review. Give a brief description of the background reading you have done in researching the underline problem. You will be awarded marks for referencing papers and books beyond the paper given.

10%

2. Choice of Technique

Why did you finally choose the technique you did? Representation, Algorithm, Operators, etc.

15%

3. Modeling, Simulation Experiment and Program Design

Give a brief description of your models, simulation experiment, parameter setting and program design.

10%

4. Simulation Experiment/Testing Strategy

What testing and experiments did you do in order to arrive at your final strategy? Detail of experimental setting and strategies, improvement and hybrids (if any)

20%

5. Results

Present your results to show that the strategy you evolved was more successful than the strategies in the paper (where successful), OR explain why you feel your results is not better than that of the paper. A tabular comparative studies and presentation of results.

20%

6. Discussion

Comment on your results and discuss what you have learnt from this assignment.

10%

7. File List and Presentation.

Provide a list of all the files you are submitting (hard and soft copy). Conformity with formatting and referencing style, with clarity of coding, output and reports).

5%

8. Hybrid Implementation and Improvement

10%

9. Extra Mark for sound technical input and hybrid with competitive results **5%**

Wish you best of luck.