Optimization 2018

Project policy

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The project is based on an article you receive and consists of three parts: 1) a literature survey; 2) implementation of a method or an application and 3) a presentation to defend the project.

Rules

- You should work in groups of three. Due to the amount of work, working alone is not feasible.
- Each group will select an assignment. Do not start working on it until your assignment is confirmed!
- Each group will hand in a **paper**, the presentation, and the Matlab code. The paper and the presentation will be handed in in electronic version as a .pdf file. The files should be sent to lucian@busoniu.net.
- The paper will be a scientific paper of minimum 3 and maximum 6 pages. The template is provided. In principle, a paper will contain
  1. Abstract (0.5p)
  2. Introduction, including a short literature review. Problem statement and proposed solution (3p)
  3. Description of the method and an illustrative example (4p)
  4. Results and discussion (2p)
  5. References: all references have to be cited in the text (0.5p).
- Do not include the Matlab code in the paper. The code should be sent separately.
- Presentation: as a pdf file.
- Deadline: the deadline for handing in all parts of the assignment is **14th of May 2018, 24:00 (midnight)**.
- Defense: the defense of the projects will take place in the framework of a symposium, in week 13. Each presentation will be allotted 20 minutes including questions and discussion.
- The grade represents 30% of your final grade.
- Special cases: if you have a very good reason for being unable to hand in your project on time, notify the lecturer immediately!

You may:

- Discuss the assignment among yourselves.
- Consult the professor or the course assistants.
- Help your colleagues to correct their assignments. Help does not include written text or code.
- Read carefully the references.

You should not:

- Work alone or more than 3 people together.
- Copy the code or report of somebody else.
- Use code or reports from other sources.
- Copy sentences or paragraphs from your references.

Procedures and logistics

This text describes the objectives, the procedure, and logistics of the project for the Optimization course.

Objectives

With the introduction of electronic publications , recent research results are becoming available at a very high pace and are easily accessible to most academic institutions as well as to the industry. However, effectively finding information through literature search is not at all easy. Therefore, this assignment aims to help students gaining experience with searching literature and writing a survey. In particular, the objectives of this assignment are to (i) acquire knowledge on recent research results through literature research and learn to effectively use search engines on the Internet, (ii) write a concise paper summarizing the findings, and (iii) present the results in a conference-like presentation.

Procedure in a nutshell

The assignment should be worked out along the following steps: form a group of three students, select a suitable assignment and make sure you understand its goal, search the literature and process the results, implement the method, write a paper, review and improve the paper, prepare a presentation, review and improve the presentation, hand in the paper and present the results at a symposium.

Groups

Form a group of three students. You are yourself responsible for finding partners for the group. Decide which team members are responsible for researching the literature, implementation, writing the paper, and preparing and presenting the talk. You have to critically review each others' work. Be critical, but fair: a review indicating everything is perfect when there are, in fact, issues to be addressed, is not helpful! The review comments must be used to improve the paper and presentation. Review forms are available for download from the course page.

Selecting an assignment

Meet with your group partners and select a suitable assignment on the page of this course. Look at the assignments and select at least three titles, in order of preference. Send your names and the assignment titles to lucian@busoniu.net. Assignments will be distributed on a first-come first-served basis. E.g. if your first preference has already been assigned to colleagues who asked before you, then your second preference will be assigned, etc.

Literature research

An assignment will typically (but not necessarily) consist of several questions related to an accompanying article. Use these questions as a guideline for your study and integrate the answers in the logical flow of your paper. However, keep in mind that the paper should be readable; do not structure it in a question–answer way! Do not restrict your reading to the article attached to the assignment, search for related articles; sufficient understanding of the subject will require further reading. Divide the work in an appropriate way - not all the members of the group have to read all the articles.

Several tips for searching and reading articles:

- Always try to organize your reading by relevance. You will never have the time to read all the articles that seem interesting. A good starting point are the references cited in the paper accompanying the assignment.
- Journal articles are typically preferable to conference articles. They are usually better written, more detailed and better thought over than conference articles. An exception to this rule is when you need to search for very recent results, which may not be published in journals yet. Most search engines allow you to select only results from journals.
- You do not need to read all the articles page-by-page. A high-level scan is recommended as a first step, to determine the relevance of the article. For instance you can read the abstract, introduction and conclusions, and scan the technical contents. If you deem the article not interesting at this point, just file it somewhere and do not give it more time.

Summarizing, the recommended search steps are: 1) search by keywords; 2) if you get many search results, save only those that appear to be more relevant; 3) scan the abstract, introduction and conclusions, if the article is not relevant, put it away; 4) read the most relevant articles with care.

Writing the paper

Work on your paper regularly as you find new results in the literature, do not postpone the writing to the last moment. Initially, not all writing has to be formal and polished. Some writing is done simply to generate thoughts and to keep a record of ideas, so they can be reviewed and revised later. Pay attention to the structure of the final paper (which, of course, must be polished!). Organize around key sentences. The point of the paragraph should be contained in a key sentence, located early in the paragraph and supported by the rest of the paragraph. Use the usual structure of scientific papers: Abstract, Introduction, one or more technical sections in the body of the paper, Conclusions and References. Use the feedback from the reviews to improve the paper. Proofread the final version of the paper at least a couple of times before delivering it, watching out for typos and mistakes, unclarity, awkward formulations, etc.

Implementation of the algorithm

The article attached to this assignment will typically present either a) the theoretical development of a novel optimization method or b) an optimization method applied to a specific application. Your task is to either a) implement the method presented in the article and compare the results with those obtained in the article or b) implement a different optimization method and apply it for the same application. In most cases, the method or the application will not be described in every detail in the original article. Direct your literature search such that you have all the necessary knowledge. For the implementation the rules for coding from the Lab policy applies.

Preparing the presentation

A good way to design a presentation is top-down: think about the overall structure first, and then go hierarchically down into the details, filling each section with content. Using pen and paper at the design stage is generally very helpful. Try to find a good balance between high-level explanations and technical detail; use examples where necessary. Include an introduction, motivation, a clear problem statement, and – at the end – a concise summary and some conclusions: the 'take-home message' that you want to leave the audience with. When deciding on the level of the presentation, take into account the background of your audience (engineering students and teachers). Most (perhaps all) of the topics will be fairly specialized; you cannot assume the audience will be familiar with such topics, so you need to spend some time introducing them!
Rehearse your presentation beforehand, making sure that you do not exceed the allotted time interval, but also that you do not fall significantly short of filling it. Since not everyone will be acquainted with the presenters, it is very important to introduce yourself clearly to the audience when starting to present.

Deliverables

As an outcome of this project, you have to hand in:

1. A paper describing your findings of the literature study. The paper must be written in a two-column format, using the provided template. The first page of the paper must clearly indicate the names of those in the group.
2. The commented Matlab code with a proper description.
3. The presentation in electronic form.

Deadlines and symposium

The deliverables must be handed in before **May 14th, 2018, 24:00 (midnight)**. The symposium will take place in week 13 of the semester. A detailed program together with the room number and the time will be published before the symposium.