Introduction

When an International Symposium on Mathematical Programming is hosted in Berlin and when Leonhard Euler is one of the local (and global) mathematical heroes, one cannot resist the temptation to begin the introduction by quoting an Euler statement from 1744 that every optimizer loves:

> *Cum enim mundi universi fabrica sit perfectissima atque a Creatore sapientissimo absoluta, nihil omnino in mundo contingit, in quo non maximi minimive ratio quaepiam eluceat; quamobrem dubium prorsus est nullum, quin omnes mundi effectus ex causis finalibus ope methodi maximorum et minimorum aeque feliciter determinari queant, atque ex ipsis causis efficientibus.*

Briefly and very freely translated: Nothing in the world takes place without optimization, and there is no doubt that all aspects of the world that have a rational basis can be explained by optimization methods. It is not so bad to hear such a statement from one the greatest mathematicians of all time.

Optimization is a mathematical discipline that differs considerably from other areas of mathematics. Practical problems, more generally, classes of problems, usually arising in fields outside of mathematics, are in the center, and mathematical models are invented that somehow grasp the essence of the problems. Then mathematical theory is developed to understand the structure of the models. And here, every branch of mathematics that helps provide insight is welcome to support the investigations. Optimization is, thus, influenced in many ways from many sources and has no unified theory, although there exist "core technologies" such as linear, nonlinear, combinatorial and stochastic optimization, each with a rich body of results. But it is not unusual that all of a sudden, methods, appearing far removed at first sight, start playing important roles. The ultimate goal of optimization is not just a good understanding of models; the research has to yield algorithms that efficiently solve the problems one has started from. And this ties optimization with the computational sciences.

One can infer from these introductory remarks that the historic roots of optimization are manifold and widespread and that there is no straight line of development. And this makes the history of optimization even more interesting. Most optimizers I know are not so keen on really thorough and scholarly historical articles. That is why I thought that the best way to popularize the history of optimization is by presenting brief entertaining and easy to read articles with a clear and narrow focus.

The articles in this book are of three types. The first type, and the majority of articles belongs to this group, is about a person (usually a famous mathematician, or sometimes a not so well-known person who deserves to come to the fore) and about one major achievement (e.g., Cauchy and the gradient method, Flinders Petrie and the TSP, or Karush and the KKT theorem). Such articles contain a brief CV of the person (unless he is too well known like Euler or Leibniz) and then discuss the particular result, algorithm, or achievement that is important for the history of optimization. I have asked the authors to also add "personal flavor", for instance, in cases where the authors had personal encounters with or have private information about the colleague portrayed.

The second type of articles is of the sort "Who invented ...?". In many cases it is not really obvious who did what first, and thus, the task of this article type is to explore the contributions and come to a conclusion. And a few articles survey certain developments such as Moore's Law, the history of column generation or of NP-completeness.

I wrote to the authors on February 22, 2012 when the serious work on this book began:

> I am not requesting a completely thorough account of the history of a certain optimization subject or a perfect CV of a great optimizer. I would like the articles to be appetizers. They should show, in particular the younger colleagues, that optimization is a fascinating human endeavor and that there are lots of interesting stories that happen in the development of our field. There can be surprises, funny and even tragic stories. There has to be serious and correct information, of course, but some human touch and/or humor should show.

In my opinion almost all authors have achieved this goal.

My initial favorite for the book title was "Short Optimization Histories". I wanted to have short articles on focused aspects of the history of optimization that should present good stories and should have the flavor of a short story in fiction literature. I considered this title a nice play with words but was defeated by my colleagues. After long discussions, even including a vote, the current title was selected. I hope it carries the desired connotations.

I am happy to mention that this book has a predecessor. For the ISMP in Amsterdam in 1991, J. K. Lenstra, A. Rinnoy Kan, and A. Schrijver edited the book *History of Mathematical Programming: A Collection of Personal Reminiscences* (CWI and North-Holland, 1991). This book contains an outstanding collection of articles by the pioneers of optimization themselves on their own achievements. Great reading, try to get a copy of this book! This present book complements the ISMP 1991 volume; it is broader in scope and provides an outside view.

Finally, I would like to thank Christoph Eyrich for all the (in the end very hectic) typesetting work and Ulf Rehmann for his help in editing the book in Documenta Mathematica style and his efficient handling of the publishing process. Believe it or not, the last article and the last requests for corrections arrived on July 24, 2012. I am confident that the printed volume is ready for distribution on August 20.

Another final remark which occurred to me while proof-reading this introduction: Did you notice that Euler used in the text quoted, the words maxima and minima, but not optimization (as I did in my rough translation)? Where is the first appearance of the term *optimization* (in any language) – in the mathematical sense? One can easily find a quote from 1857, but is this the first? I do not know. If you have a clue, please, send me an email.

And the final final remark: Some authors suggested opening Wikis (or something like that) on some of the topics discussed in this book. This issue will be explored in the near future. The history of the usage of the term optimization could, in fact, be a good "starting Wiki".

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