AN OVERVIEW OF MATLAB

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ABSTRACT

Our presentation reviews the mathematical software MATLAB from a decision-making researcher's and professor's point-of-view. We evaluate MATLAB strength's and limitations for teaching, research, and self-instructions. Our presentation discusses the alternative uses of MATLAB by studying ten programs. The paper supporting the presentation also includes comments, recommendations, and suggestions for decision-sciences professionals interested in MATLAB, and also a selection of the best bibliographical references to get started with MATLAB. We are not affiliated in any way with MATLAB's developer – The Mathworks, Inc. Our summary evaluation is that, for decision sciences researchers, MATLAB is an excellent tool for advanced learning and for evaluating potential research ideas. It is also an excellent tool for illustrating complex topics during lectures, where it may serve as a complement to Microsoft Excel, given the entrenchment of the latter in business analysis and in the classroom.

The presentation will be organized as follows:

I. MATLAB and my purchase of MATLAB
II. Using MATLAB
III. MATLAB programs

We will cover the relevant aspects of using both the numerical and symbolic analysis capabilities of the MATLAB, which stands for matrix-laboratory. We will also review the following 10 specific programs that illustrate some of MATLAB's strengths:

Program 1 illustrates different ways to perform common procedures.
Program 2 provides an example of the symbolic equation solver, which can be applied to linear and nonlinear equations.
Program 3 shows symbolic analysis in action using the EOQ inventory model.
Program 4 uses the symbolic toolbox to obtain closed form solutions to a set of simultaneous differential equations (first order, non-homogenous, Cauchy's problem) by different methods.
Program 5 uses the matrix exponential function to show the evolution of a three-variable system of differential equations, from initial to ending values, when the time index is allowed to vary.
Program 6 shows code to calculate a textbook version of the tangent portfolio.
Program 7. Symbolic solver: simultaneous equations system. The same portfolio optimization problem using a set of simultaneous equations is now processed analytically.
Program 8. Symbolic Lagrange optimization with the usual two linear restrictions.
Program 9. Portfolio optimization using fminsearch().
Program 10. Here we present the code for plotting 3D (surface) charts in MATLAB.