SCILAB

(A Free Software to MATLAB)

"This book is good news for science & technology students and researchers."
Dr. Kurchania P. Isaac
Member Secretary, AICTE
Govt of India

Er. HEMA RAMACHANDRAN
Dr. ACHUTHSANKAR S. NAIR

S. CHAND

SCILAB
(A Free Software to MATLAB)

SCILAB
(A Free Software to MATLAB)

Er. HEMA RAMACHANDRAN
B.Tech., M.Tech., M.Phil., PG Diploma (Software Engg.)
Speed-IT Research Fellow,
College of Engineering, Trivandrum
Former Principal, University College of Engineering,
University of Kerala,
Kerala

Dr. ACHUTHSANKAR S. NAIR
B.Tech., M.Tech., M.Phil. (Engg.), Ph.D. (Elec. Engg.)
Director, State Inter-University Centre of Excellence in Bio-informatics
University of Kerala, Trivandrum
Former Director, C-DIT, Government of Kerala
Kerala

S. CHAND & COMPANY LTD.
(AN ISO 9001 : 2008 COMPANY)
RAM NAGAR, NEW DELHI - 110055

S. CHAND & COMPANY LTD.

(An ISO 9001 : 2008 Company)

Head Office: 7361, RAM NAGAR, NEW DELHI - 110 055
Phone: 23672080-81-82, 9899107446, 9911310888
Fax: 91-11-23677446
Shop at: **schandgroup.com;** e-mail: **info@schandgroup.com**

Branches :

AHMEDABAD : 1st Floor, Heritage, Near Gujarat Vidhyapeeth, Ashram Road, **Ahmedabad** - 380 014, Ph: 27541965, 27542369, ahmedabad@schandgroup.com

BENGALURU : No. 6, Ahuja Chambers, 1st Cross, Kumara Krupa Road, **Bengaluru** - 560 001, Ph: 22268048, 22354008, bangalore@schandgroup.com

BHOPAL : Bajaj Tower, Plot No. 243, Lala Lajpat Rai Colony, Raisen Road, **Bhopal** - 462 011, Ph: 4274723. bhopal@schandgroup.com

CHANDIGARH : S.C.O. 2419-20, First Floor, Sector - 22-C (Near Aroma Hotel), **Chandigarh** -160 022, Ph: 2725443, 2725446, chandigarh@schandgroup.com

CHENNAI : 152, Anna Salai, **Chennai** - 600 002, Ph: 28460026, 28460027, chennai@schandgroup.com

COIMBATORE : No. 5, 30 Feet Road, Krishnasamy Nagar, Ramanathapuram, **Coimbatore** -641045, Ph: 0422-2323620 coimbatore@schandgroup.com **(Marketing Office)**

CUTTACK : 1st Floor, Bhartia Tower, Badambadi, **Cuttack** - 753 009, Ph: 2332580; 2332581, cuttack@schandgroup.com

DEHRADUN : 1st Floor, 20, New Road, Near Dwarka Store, **Dehradun** - 248 001, Ph: 2711101, 2710861, dehradun@schandgroup.com

GUWAHATI : Pan Bazar, **Guwahati** - 781 001, Ph: 2738811, 2735640 guwahati@schandgroup.com

HYDERABAD : Padma Plaza, H.No. 3-4-630, Opp. Ratna College, Narayanaguda, **Hyderabad** - 500 029, Ph: 24651135, 24744815, hyderabad@schandgroup.com

JAIPUR : A-14, Janta Store Shopping Complex, University Marg, Bapu Nagar, **Jaipur** - 302 015, Ph: 2719126, jaipur@schandgroup.com

JALANDHAR : Mai Hiran Gate, **Jalandhar** - 144 008, Ph: 2401630, 5000630, jalandhar@schandgroup.com

JAMMU : 67/B, B-Block, Gandhi Nagar, **Jammu** - 180 004, (M) 09878651464 **(Marketing Office)**

KOCHI : Kachapilly Square, Mullassery Canal Road, Ernakulam, **Kochi** - 682 011, Ph: 2378207, cochin@schandgroup.com

KOLKATA : 285/J, Bipin Bihari Ganguli Street, **Kolkata** - 700 012, Ph: 22367459, 22373914, kolkata@schandgroup.com

LUCKNOW : Mahabeer Market, 25 Gwynne Road, Aminabad, **Lucknow** - 226 018, Ph: 2626801, 2284815, lucknow@schandgroup.com

MUMBAI : Blackie House, 103/5, Walchand Hirachand Marg, Opp. G.P.O., **Mumbai** - 400 001, Ph: 22690881, 22610885, mumbai@schandgroup.com

NAGPUR : Karnal Bag, Model Mill Chowk, Umrer Road, **Nagpur** - 440 032, Ph: 2723901, 2777666 nagpur@schandgroup.com

PATNA : 104, Citicentre Ashok, Govind Mitra Road, **Patna** - 800 004, Ph: 2300489, 2302100, patna@schandgroup.com

PUNE : 291/1, Ganesh Gayatri Complex, 1st Floor, Somwarpeth, Near Jain Mandir, **Pune** - 411 011, Ph: 64017298, pune@schandgroup.com **(Marketing Office)**

RAIPUR : Kailash Residency, Plot No. 4B, Bottle House Road, Shankar Nagar, **Raipur -** 492 007, Ph: 09981200834, raipur@schandgroup.com **(Marketing Office)**

RANCHI : Flat No. 104, Sri Draupadi Smriti Apartments, East of Jaipal Singh Stadium, Neel Ratan Street, Upper Bazar, **Ranchi** - 834 001, Ph: 2208761, ranchi@schandgroup.com **(Marketing Office)**

SILIGURI : 122, Raja Ram Mohan Roy Road, East Vivekanandapally, P.O., **Siliguri-**734001, Dist., Jalpaiguri, (W.B.) Ph. 0353-2520750 **(Marketing Office)**

VISAKHAPATNAM : Plot No. 7, 1st Floor, Allipuram Extension, Opp. Radhakrishna Towers, Seethammadhara North Extn., **Visakhapatnam** - 530 013, (M) 09347580841, visakhapatnam@schandgroup.com **(Marketing Office)**

First Edition 2012

ISBN : 81-219-3970-4 **Code :** 20 139

PRINTED IN INDIA

By Rajendra Ravindra Printers Pvt. Ltd., 7361, Ram Nagar, New Delhi -110 055
and published by S. Chand & Company Ltd., 7361, Ram Nagar, New Delhi -110 055.

PREFACE

Technical and Scientific Computing is an important application area of computer science and has been heavily centred around MATLABS - hailed very often as the language of technical and scientific computing. This "matrix laboratory" has been around for almost 3 decades and has found a permanent place not only in curricula of applied science and engineering studies, but also in research and development arena. While there is no doubt that MATLAB has been emerging stronger and stronger, with the acceleration in popularity of free-software movement all over the world, need was felt for a free-software alternative to MATLAB. Though the early versions of such an alternative - SCILAB - appeared in 90's itself, it was not until much later that it acquired the attention it deserved. Today it has picked up sufficient momentum by establishing its presence in the field, especially academia. However, its onward march is hampered by the lack of a comprehensive primer introducing it. There are some very nicely written tutorials and user guides, good in patches and not covering the core of features. This book is planned to fill that lacunae. We have modelled it after the standard primers in MATLAB and hence would by easy speed-reading for MATLAB users and also for elaborate study of first-timers in scientific computing. We have chosen statistics, image processing and Scicos tool boxes as special treatment, mainly aimed at hardcore science and technology workers. Exercises appear in all chapters to suit academic use of the book.

We would like to thank Dr. Claude Gomez, Director of Scilab Consortium, France, for his encouragement in publishing this book. Of course we are grateful to our students which were the seeds of this book. We benefitted immensely by their critical feedback and also appreciation. We look forward to critical and creative feedback as a fuel for improvement in future editions.

We hope this book finds it way to not only class rooms but also research labs. We enjoyed writing this book and we hope the reader also has an enjoyable reading experience.

AUTHORS

CONTENTS

CHAPTER 1

Introduction to Scilab

1.1 WHAT IS SCILAB ?

If you are already familiar with the software package known as Matlab and you are also aware of the free software movement, then it is easy to answer the question "What is Scilab?'' - Scilab is a free software alternative to Matlab. For the sake of readers who may be unfamiliar with either or both of Matlab and free softwares, we present in this chapter a brief introduction of the same. However, the reader may also skip this chapter in the first reading and begin with the second chapter, and gain a first hand understanding of Scilab.

1.2 MATLAB

Matlab, believed to be used by over a million users in industry and academia, appeared in late 1970s and has become a hot favourite of users who are either not skilled or simply uninterested in getting entangled with syntax of languages like C or Pascal, even to solve simple problems. Matlab is hailed as the language of technical computing and often described as a "Quick and Dirty" programming language. The interpreted nature makes it "quick" and the "dirty" part indicates its flexibility of syntax, which programming puritans might not agree with. Formally, Matlab is a numerical computing environment and fourth generation programming language. It is developed by The MathWorks. Among Mathlab's capabilities, the key is matrix manipulation (the name Matlab itself is an acronymn of Matrix Laboratory), handling of functions and data, implementation of algorithms and creation of user interfaces. Matlab is well known for the many tool boxes (specialized collection of commands and features which can be added on to basic Matlab), in specialized areas of science, technology, mathematics, statistics etc. Release 7.8 is in vogue in 2011.

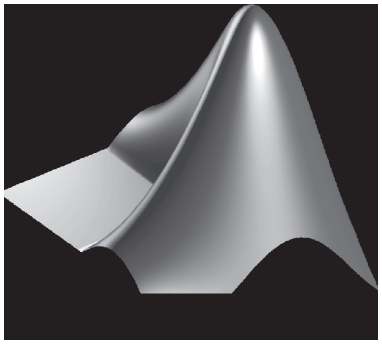


Fig 1.1 Logo of Matlab

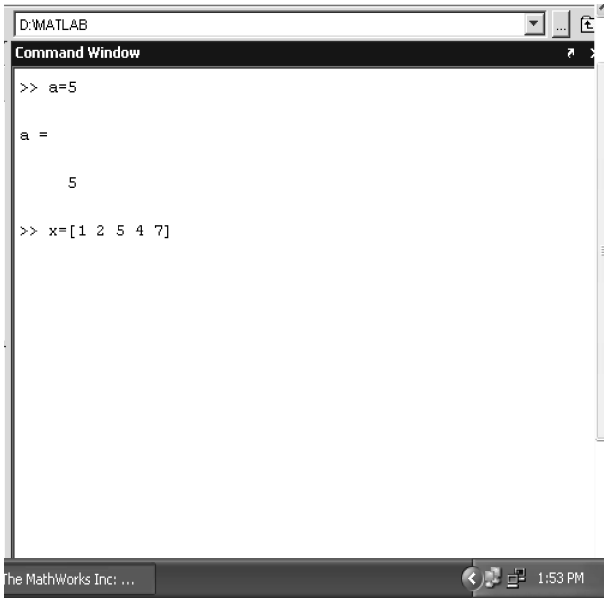


Fig 1.2 Matlab window

Matlab is a proprietary software and a licence fee is mandatory for its use. The tool boxes are optional and each comes under its own licence fee. As we will see in the next section, the free software movement attempts to offer technically, ethically superior and free alternatives to proprietary softwares. There are many free open source alternatives to Matlab, in particular GNU Octave, FreeMat, and Scilab. They attempt to be compatible with the Matlab language. The statistical language S also can be considered in this category as it treats arrays as basic entities. The open source language R is an implementation of S.

1.3 FREE SOFTWARE

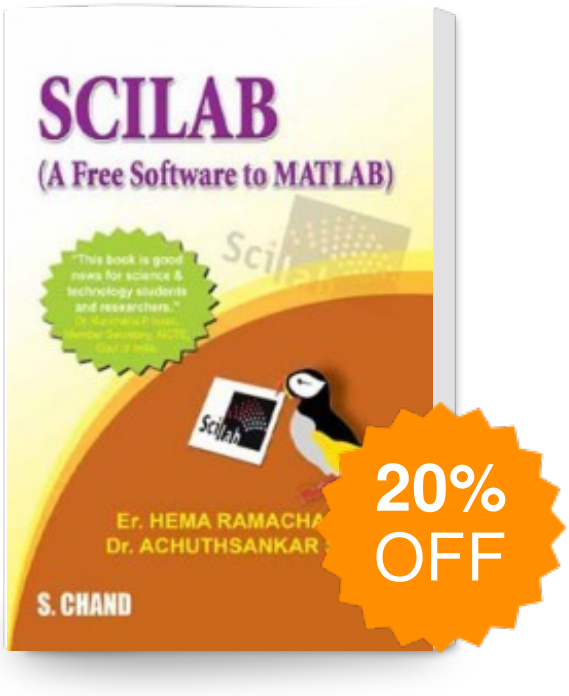
Wikipaedia defines free software as follows; "Free software or software libre is software that can be used, studied, and modified without restriction, and which can be copied and redistributed in modified or unmodified form either without restriction, or with minimal restrictions only to ensure that further recipients can also do these things and that manufacturers of consumer-facing hardware allow user modifications to their hardware. Free software is available gratis (free of charge) in most cases". Free software ideas originated from Richard Stallman who conceived the free software movement in 1983. The Free Software Foundation was founded soon after to advance Stallman's free software ideas. It may be noted that there are currently alternative terms for free software such as "software libre", "Free and Open Source Software" ("FOSS") and "Free, Libre and Open Source Software" ("FLOSS").

A free software generally permits 4 kinds of freedom to its users:

- The freedom to run the software anywhere, anyway
- The freedom to copy and distribute
- The freedom of access to the source code of the software
- The freedom to modify and redistribute

A philosophical discussion of free software ideology is beyond the scope of this book.

SCILAB (A Free Software To MATLAB)



Publisher : SChand Publications ISBN : 9788121939706

Author : Er. Hema Ramachandran, Dr. Achuthsankar S. Nair