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Books and Chapters published in edited volumes

Additional Information

Fundamental Concepts of MATLAB Programming

From Learning the Basics to Solving a Problem with MATLAB

DR. BRIJESH BAKARIA
DR. KULWINDER SINGH PARMAR

Description

Learn how to use MATLAB commands and functions in an efficient and effective manner

MATLAB has been an essential platform for data computation. There are various types of technologies that are going on, but it requires a tool for data handling. MATLAB provides better computing power for a massive amount of data.

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This book will be your comprehensive guide to creating applications, simulation, computation measures. The book begins with an introduction MATLAB and quickly goes on to teach you the usage of MATLAB. After this, we will explore the various commands and essential concepts and topics about MATLAB. Moving forward, we'll explore importing and exporting data, handling data, and visualization of data through different ways to plot a graph. Towards the end, we will explore the basic algebraic functions used in MATLAB.

Key Features

- Get familiar and work with the in-built functions in MATLAB
- Learn how to solve algebraic equations in MATLAB
- Explore various techniques for plotting numerical data
- Learn how to preprocess data to ensure accurate, efficient, and meaningful analysis
- Learn how to issue commands to create variables and call functions

What Will You Learn

- Learn how to build and run MATLAB statements
- Execute a block of code repeatedly using the Loop Control Statements
- Create a user-defined function by using MATLAB
- Create, Concatenate, and Expand the most basic MATLAB data structure; Matrix
- Understand how to plot a 2D and 3D graph

Who This Book is For

This book is for everyone from the Engineering and Sciences background. It is also for PGDCA, B.Tech, B.E., BCA, BSc, M.Tech. /M.E., MCA, M.Com., MSc, Ph.D. other UG, and PG degree students.

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2. Expressions and Basic Commands of MATLAB
3. Data Types, Variables and Operators
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5. Loops Control Statements
6. Vectors
7. Matrix
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9. Strings
10. Functions
11. Data Import and Export
12. Plotting a Graph
13. Graphics
14. Basic Algebra in MATLAB

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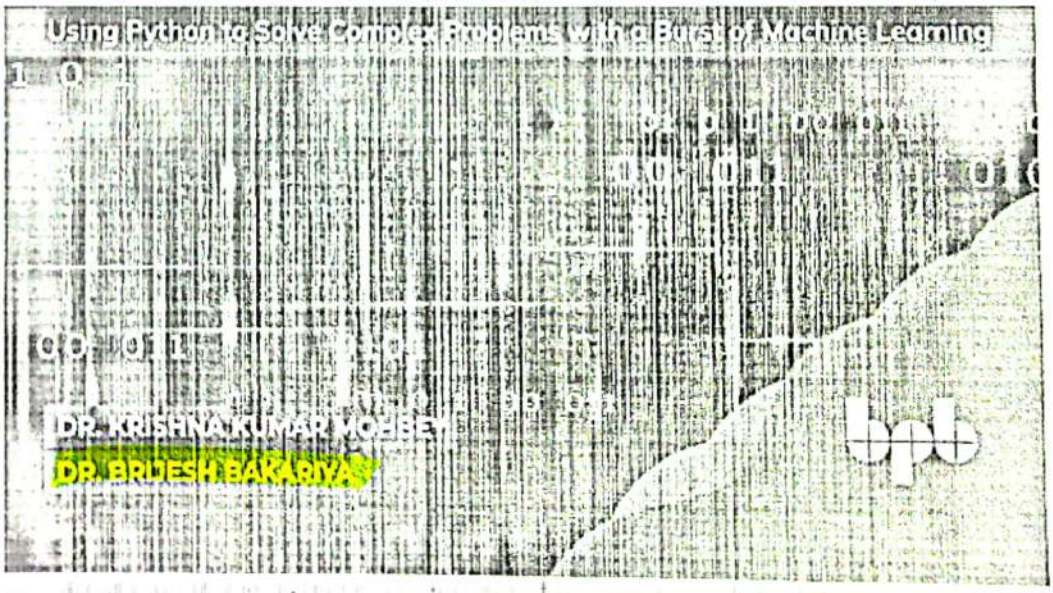
An Introduction to Python Programming: A Practical Approach



step-by-step approach to Python programming with machine learning fundamental and theoretical principles.

KEY FEATURES

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- Introduces readers to Python programming in a very simple way.
- Extensive practical demonstration of Python concepts using numerous examples.
- Implementation of machine learning in Python using hands-on techniques.

DESCRIPTION

The book 'Introduction to Python Programming: A Practical Approach' lays out a path for readers who want to pursue a career in the field of computer software development. It covers the fundamentals of Python programming as well as machine learning principles. Students will benefit from the examples that are included with each concept, which will aid them in understanding the concept.

This book provides a practical understanding of Python programming using numerous programs and examples. It also develops problem-solving and code-writing abilities for the readers. This book covers Python fundamentals, operators, and data structures such as strings, lists, dictionaries, and tuples. It also contains information on file and exception handling. The implementation of a machine learning model has also been included in this book.

With the help of this book, students and programmers can improve their programming skills as well as their ability to sprint towards a rewarding career.

WHAT YOU WILL LEARN

- Learn Python concepts, operators, and data structures.
- Learn the properties and operations of lists, tuples, and dictionaries.
- Write Python code to solve specific issues.
- Write Python code to handle disk files and exceptions.
- Work with OOPS properties like classes, objects, constructors, inheritance, and polymorphism.
- Use machine learning for classification, regression, prediction, and clustering.

WHO THIS BOOK IS FOR

This book is intended for current and aspiring emerging technology professionals, students, and anyone else who wishes to better understand the Python programming language and machine learning concepts.

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12. Chapter 12: Machine Learning with Python
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Lecture Notes in Mechanical Engineering

Saroj Kumar Acharya
Dipti Prasad Mishra *Editors*

Current Advances in Mechanical Engineering

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Prediction of Thermal Aspects for Brass Material-Based Natural Convection Heat Transfer System by Using Adaptive Neuro-fuzzy Inference System

Surjeet Singh, Shashi Bahl, Sandeep Trehan, Deepam Goyal, and Ashok Kumar Bagha

Abstract In this paper, a model based on adaptive neuro-fuzzy inference system (ANFIS) is developed to predict the behavior of a natural thermal convection system. ANFIS model is able to successfully imitate the effects of variation in input parameters such as current and voltage on the response parameters such as temperature at different locations of the thermal system. The results obtained with the help of the developed ANFIS model are compared with the findings of the experiments in the form of graphs and also numerically by determining the error norms. Comparison of the ANFIS model-based predictions with the actual experimental results shows that the proposed model is able to identify the behavioral characteristics of the natural convection thermal system very accurately. The outcome of the proposed model is found out to be the best for the prediction of temperature at the location of fourth temperature sensor where the level of temperature is low. The proposed ANFIS model can be used further to develop a control system in order to control the temperature at different locations of the thermal system by varying the current and voltage parameters.

Keywords Thermal aspects · Brass heat transfer system · Adaptive · Neuro-fuzzy inference

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S. K. Acharya and D. P. Mishra (eds.), *Current Advances in Mechanical Engineering*, Lecture Notes in Mechanical Engineering,
https://doi.org/10.1007/978-981-33-4795-3_74

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State Space Method to Predict the Modal Model of a Five Degree of Freedom Spring Mass Vibratory System

Nitin Gupta, Ashok Kumar Bagha, and Shashi Bahl

Abstract In this paper, a state space method is used to predict the modal model of a five degree of spring-mass vibratory system. To predict the modal model, various MATLAB commands such as '*lsim*' to obtain the response in time domain and '*freqresp*' to obtain the response in the frequency domain are used. In this work, state space formulation is used to convert the five degree coupled equations into single degree an un-coupled second order differential equations. Then the state space entities such as system matrix, input matrix, output matrix and direct transmission matrix will be predicted. The main objective of this work is to predict the response of the system at different masses by applying unit impulsive load excitations. To solve the Eigen value problem MATLAB '*eig*' command is used. It is observed that the state space formulation is very simple and easy to apply for n-degree of freedom system model. Also, it can be concluded that the state space method formulation along with MATLAB commands is very effective to predict the response of the system either in time domain or in frequency domain.

Keywords State space method · Coupled equations · Time domain · Frequency domain · Vibrations · Modal analysis

1 Introduction

The mechanical vibratory system has multiple inputs and outputs and it becomes more complex with differential equations and transfer functions. The vibration analysis of multi degree engineering system requires the solution of partial differential equations, which is difficult to solve. In fact, many partial differential equations does

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S. K. Acharya and D. P. Mishra (eds.), *Current Advances in Mechanical Engineering*, Lecture Notes in Mechanical Engineering,
https://doi.org/10.1007/978-981-33-4795-3_47

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Artificial Intelligence (AI) and Its Applications in Indian Manufacturing: A Review

Ali Tarab Rizvi, Abid Haleem, Shashi Bahl, and Mohd Javaid

Abstract Artificial intelligence (AI) is globally acknowledged as innovative technology. Today, many corporations and individuals are making an effort to harness the capabilities of AI in almost all sectors viz. healthcare, education, manufacturing, smart cities, agriculture, etc. The concept of 'Smart Factories' and 'Industry 4.0' has prompted many global enterprises to use automation and intelligent robots to improve manufacturing and enhance the quality of the finished product and overall productivity. Indeed, artificial intelligence is a vital tool to augment manufacturing by facilitating the R&D, enhancing the quality, reducing the errors, and maintaining the supply chain by projecting demand forecasting and simulation of outcomes to foster higher margins in stiff competition. However, the requirement is to build an industry that should be compliant with such disruptive changes and a workforce compatible enough to create a collaborative environment for both men and technology to work productively. Thus to conduct this study, several keywords and their combinations were used and explored using Google Scholar. The relevant articles, papers, and journals obtained were examined, and data pertinent to the study were collected, examined, and aggregated. Furthermore, specific changes in the current policies and the working parameter were also suggested. In this paper, the scope of artificial intelligence and its applications in today's manufacturing sector of India is discussed. Here, the Indian manufacturing sector's present status is focused primarily, the limitations are identified and how they can be dealt with.

Keywords Artificial intelligence (AI) · Industry 4.0 · Smart manufacturing

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S. K. Acharya and D. P. Mishra (eds.), *Current Advances in Mechanical Engineering*, Lecture Notes in Mechanical Engineering,
https://doi.org/10.1007/978-981-33-4795-3_76

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Prospects of Jewelry Designing and Production by Additive Manufacturing

Nosheen Fatma, Abid Haleem, Shashi Bahl, and Mohd Javaid

Abstract Innovation in the designing process and its strategic implementation opens diverse possibilities. This concept in the jewelry and artifacts can reap enormous benefits when used with additive manufacturing (AM) technologies. AM has established its proficiency in various manufacturing sectors, medical fields, and art as it offers freedom, customization, and quick changes in design. This study investigates the use of additive manufacturing in jewelry modeling, jewelry design, and manufacturing. Additionally, modeling of ornaments has been carried out by using Rhinoceros software. We also provide a brief overview of the use of smart jewelry. These days, smart medical alert devices like smart watches could be developed as an ornamental and health device. These are used to check various health conditions like temperature, heart rate, calorie burn data, and sleep cycle. Furthermore, with AM, they can be customized and manufactured based on the individual customer's requirement. Similarly, for other ornamental devices, this will open a new field with enormous scope.

Keywords Additive manufacturing · Jewelry designing · Jewelry modeling · Rhinoceros software · Smart health care

1 Introduction

Today additive manufacturing is the most common terminology of the industry, while three-dimensional printing is mostly useful in the consumer market. The distinct benefits of additive manufacturing make it an accessible technology. According to the standard ASTM F42 Committee, additive manufacturing is defined as 'process of joining material to make objects from the 3D model data, usually layer upon layer,

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S. K. Acharya and D. P. Mishra (eds.), *Current Advances in Mechanical Engineering*, Lecture Notes in Mechanical Engineering,
https://doi.org/10.1007/978-981-33-4795-3_80

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Avinash Kumar Agarwal

Alternative Fuels and Advanced Combustion Techniques as Sustainable Solutions for Internal Combustion Engines

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Effect of 1,4-Dioxane Emulsified Fuel on Diesel Engine Performance and Emission Operating with Varying Injection Timing

Vigneswaran Rajendran, Dhinesh Balasubramanian, Akash Deep, and Sunil Kumar Mahla

1 Introduction

Global energy requirements, limited availability of fossil resources, environmental pollution and future sustainability goals have urged the research community to search for suitable alternative energy sources. Diesel powertrains are dominating and widely utilized in on-road, off-road, marine and stationary sectors due to their immense thermal efficiency, long-lasting nature and more dependability [2]. Parallelly, the significant issues that come up with diesel powertrains are emissions, huge consumption of fuel and adverse health issues [22]. Many replacements have been investigated for diesel powertrains like biodiesel, alcohols, emulsion, nanofuels, etc. along with minor adjustments like combustion bowl geometry, injection timing, pressure and compression ratio [10, 11, 18, 28]. Diesel/water emulsion fuel with additives as a suitable alternative is being tried nowadays by the research community [27].

Lin and Wang [14] investigated the diesel powertrain with two types of emulsion fuels. From their studies, they identified that CO and brake-specific fuel consumption (BSFC) increased for the alternative fuels due to quenching of fuels with the presence

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A. P. Singh et al. (eds.), *Alternative Fuels and Advanced Combustion Techniques as Sustainable Solutions for Internal Combustion Engines*, Energy, Environment, and Sustainability, https://doi.org/10.1007/978-981-16-1513-9_9

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Validation and Multi-response Optimization of Topological and Geometrical Parameters of Stainless Steel Cantilever Beam with Finite Element Analysis Subjected to Point Load Using Taguchi L_9 Orthogonal Array Integrated with Utility Methodology

Shubham Sharma, Shalab Sharma, J. Singh, Gursharan Singh, Abhinav Sharma, Vivek Agarwal, Munish Mehta, S. K. Mahla, and Gurpreet Singh

Abbreviations and Nomenclature Used

FEM	Finite element method
FEA	Finite element analysis
S/N	Signal-to-noise proportion
B′	Width/Breadth of cantilever strut

Declaration of Conflict of Interest The authors declare that they have no conflict of interest with respect to the research, authorship, and/or publication of this article.

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S. Singh et al. (eds.), *Advances in Materials Processing*, Lecture Notes in Mechanical Engineering, https://doi.org/10.1007/978-981-15-4748-5_27

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