Mathematical foundation for ai and machine learning pdf

This is the code store for the Mathematical Foundation for AI and Machine Learning [Video], released by Packt. It contains all the project support files needed to work through the video tutorial from start to finish. About the video course artificial intelligence has gained importance in the last decade with a lot depending on the development and integration of AI in our daily lives. The progress already made by AI is staggering innovations such as self-driving cars, medical diagnosis and even beating people in strategy games like Go and Chess. The future of AI is hugely promising and not far from the time we have our own robotic companions. This pushed many developers to start writing codes and start developing for AI and ML programs. However, learning how to write algorithms for AI and ML is not easy and requires extensive programming and mathematical knowledge. Mathematics plays an important role because it builds the basis for programming for these two streams. And in this tutorial we dealt with exactly that. We have designed a complete course to help you master the mathematical basis needed to write programs and algorithms for AI and ML. What you will learn To update mathematical concepts for AI and Machine Learning Learn how to implement algorithms in Python Understand how concepts extend to real problems with ML Guidelines and navigation knowledge to take full advantage of the coverage included in this tutorial, you will need: Ariel Procaccia email: arielpro@gmail.com Phone number: (0265)85778 Office: Ross 22 (floor -1) Hours: Anytime, but please send an email or call for the first time + Place of the second semester, Wednesday, 12:00-13:45, on Levine 8 Bureaucracy 2 credit points Course number: 67686 Target audience: 3rd year BSc / MSc / PhD students in cs school and engineering Prior requirements: Algorithms (67504) and quantification (67521) Course requirements : [typist or project] and [take home exam] Course description While many research in the field of artificial intelligence uses heuristics as a modus operandi , other researchers tend to analytical analysis. This course is designed to take a close look at some of the most fascinating topics in Artificial Intelligence and approach them from a mathematical point of view. A significant part of the course will focus mainly on multiagent systems: groups of (usually selfish, heterogeneous) agents who argue, negotiate, reach agreements and cooperate. Gaming theoretical tools will be central to many models with which we will deal, but no prior knowledge of game theory will be assumed. In addition, prior knowledge in the field of artificial intelligence is not required. Projects Projects should be carried out by students who are not listed as typers. The deadline is 18.7.08. Here are the full instructions. Pass the home exam Link to the exam is available; detailed instructions can be found inside. The deadline is 31.8.08. Final marks The following file contains y typers, exam and final grades of the course. The final mark is the average of the project/typer mark and the test mark. Note that I didn't have a degree printed exam, but you can see your score for each individual question. The following file contains a concise and elegant test solution (beware of minor typos in the fourth quarter). If you feel like you've been seriously wronged, you can contact me by email, but the signs are really very high already. For y typist: Lecture notes must be prepared at LaTex. Here's a sample LaTex file and the definitions that go with it. You may also need a latex tutorial. Lecture 1, 14.5.08: Alpha-Beta Pruning Scribe: Aviv Zohar. Lecture 2, 21.5.08: Robotic Motion 1 (coverage) Ref: Multi-Robot Forest Coverage Warriors: Reshef Meir, Yoni Peleg and Nir Pochter Lecture 3, 28.5.08: Robotic Motion 2 (Search) Ref: Improved Analysis D * Typers: Dana Attias, Yair Movshovitz and Keren Haas Lecture 4, 4.6.08: Problems Limiting Satisfaction 1 Refs: Survey of Affectable CSP | From Local to Global Consistency Ists: Bracha Hod and Zvi Vlodavsky Lecture 5, 11.6.08: Limiting Satisfaction Problems 2 Ref: Sufficient Condition for Backtrack-Free Search Yakers: Dan Friedman, Rivka Oster, and Noam Aigerman (due 2.7.08) Lecture 6, 18.6.08: Social Choice 1 Ref: Proof of Gibbard-Satterthwaite Theorem Revisited Scribes: Ezra Resnick and Ariel Imber Lecture 7, 25.6.08: Social Choice 2 Refs: Computational Difficulty of Election Manipulation | Universal Voting Protocol Tweaks to Handle Hard Scribes: Amit Goldstein, Roi Schwarz, and Yoav Wilf Lecture 8, 2.7.08: Fair Division 1 Ref: Envy-Free Cake Division Protocol Ists: Hila Weisman, Liron Mordechy and Dafna Hirshfeld Lecture 9, 9.7.08: Fair Division 2 Refs: Types of Contracts for Task Assignment: I Theoretical Results | The maximum class of utility features for effective one-to-one negotiations | Achieving Envy-Free States in Distributed Negotiation Setup Songs: Adi Ben Yoash, Avishay Maya, and Gilad Friedman Lecture 10, 23.7.08: Fair Division 3 Refs: Communication Requirements for Effective Allocation and Support of Lindahl Prices | On Approximately Envy-Free Ruffs of Indivisible Goods Y typists: Yuval Vardi, Yosef Prat, and Assaf Weiner Lecture 11, 30.7.08: Coalition Formation Ref: Complexity of solution design at the core based on synergies between coalitions Ywriters: Michael Zuckerman and Na'ama Zohary Upon completion of this module, students will have a basic understanding of mathematical concepts behind some key methods in the field of artificial intelligence and machine learning. They understand the connection between the mathematical structure and its practical implementation and apply the studied methods in selected applications. A firm understanding of the mathematical principles of machine learning is essential to recognise under what conditions methods work or do not work, thus obtaining and a thorough understanding of machine learning methods. In recent years, AI has entered a new era with a remarkable impact on technology and the economy. This progress has been mainly linked to the recent success of machine learning. This course will include mathematical basics and precise concepts behind some of the most important methods of machine learning and artificial intelligence. The emphasis in this course will be on the strict mathematical principles behind how and why methods work (or do not work). Topics include curses and blessings of dimensionality, randomized algorithms, linear and nonlinear dimension reduction methods, graphs and clustering, community detection, sparsity and massive data, diffuse maps, and the internal geometry of high-dimensional data, as well as convex and non-kouvexic optimizations. Linear algebra and basic background probability will be required, as well as basic programming experience (e.g. Some basic knowledge in y optimization is recommended. Mathematical methods, principles and algorithms of artificial intelligence will be presented during the lecture on the board and through slides. Written final examination in the form of a project report. Students will write a report describe how they apply some of the methods and concepts obtained in this course in the application. The report may focus either on theoretical analysis, numerical aspects and/or on practical elements of the use of mathematical methods in the field of artificial intelligence and machine learning. A detailed list of links will be provided. Some original works will be provided through downloading. Restore mathematical concepts for AI and Machine Learning Learn how to implement algorithms in pythonA note how concepts extend to real-world problems ML Scalar, Vectors, Nuts and Tensors21:1409:35Vectors, Matrices, and tensors in Python21:27Special matrices and vectors13:35Eigenvalues and Eigenvectors11:41Norms and Eigendecomposition28:And 21Denunciation derivatives1 9:2411:0818:49Intro to Probability Theory11:00Probability Distributions10:13Expectation, Dispersion, and Covariance11:23Graphic probability distribution in R12:3109:4910:52Bonus Lecture: Other interesting things, offers and discounts s00:23 Basic knolwedge python is assumed, because concepts are encoded in python and R artificial intelligence has gained importance in the last decade with much depending on the development and integration of AI in our daily lives. The progress AI has already made is staggering with self-driving cars, medical diagnosis and even betting people on strategy games like Go and Chess. The future of AI is hugely promising and not far from the time we have our own robotic companions. This pushed many developers to start writing codes and start developing for AI and ML programs. However, learning to write algorithms for AI and ML is not easy and requires extensive programming and math Mathematics plays an important role because it builds the basis for programming for these two streams. And in this tutorial we dealt with exactly that. We have designed a complete course to help you master the mathematical basis needed to write programs and algorithms for AI and ML. The course was designed in collaboration with industry experts to help you break down the difficult mathematical concepts known to one into more easily understandable concepts. The course covers three main mathematical theories: Linear Algebra, Multivariation Calculus and Probability Theory. Linear algebra – Linear algebra notation is used in machine learning to describe the parameters and structure of various machine learning algorithms. This makes linear algebra a necessity to understand how neural networks are assembled and how they work. It covers topics such as: Scalar, Vectors, Matrix, Tensors Matrix Norms Special Matrix and Vectors Eigenvalues and Eigenvectors Multivariate Calculus – It is used to supplement the learning part of machine learning. This is what is used to learn from examples, update the parameters of different models and improve performance. It covers topics such as: Derivatives Integrals Gradients Differential Operators Convex Optimization Probability Theory – Theories are used to make assumptions about the underlying data when we are designing these deep learning or AI algorithms. It is important that we understand the key distribution of probability, and we will cover in depth in this tutorial. It includes topics such as: Elements of probability random variable distribution variance and anticipation of a special random variable course also includes projects and quizzes around each section to help consolidate your knowledge of the topic, as well as learn exactly how to use concepts in real life. At the end of this tutorial, you will not only have the knowledge to create your own algorithms, but also the confidence that you will actually start using your algorithms in your other projects. Sign up and become the next AI champion with this basics course! Anyone who wants to restore or learn the math tools needed for AI and machine learning will find this course very useful to 1+ million students worldwide | 200+ Courses3.9 Instructor Rating86,394 Reviews1,205,657 Students251 CoursesEduonix creates and distributes high quality technology training content. Our team of professionals in the field has been training the workforce for more than ten years. We try to learn technology as it is used in industry and the professional world. We have a professional team of trainers for technologies from mobility, web and database and server Administration.E.3.9 Instructor Reviews84,022 Reviews1,182,072 Students191 Courses