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A PRACTICAL GUIDE THAT WILL HELP YOU UNDERSTAND THE STATISTICAL FOUNDATIONS OF ANY MACHINE LEARNING PROBLEM ? KEY FEATURES? DEVELOP A CONCEPTUAL AND MATHEMATICAL UNDERSTANDING OF STATISTICS GET AN OVERVIEW OF STATISTICAL APPLICATIONS IN PYTHON LEARN HOW TO PERFORM HYPOTHESIS TESTING IN STATISTICS UNDERSTAND WHY STATISTICS IS IMPORTANT IN MACHINE LEARNING LEARN HOW TO PROCESS DATA IN PYTHON ? DESCRIPTION? ? THIS BOOK TALKS ABOUT STATISTICAL CONCEPTS IN DETAIL WITH ITS APPLICATIONS IN PYTHON THE BOOK STARTS WITH AN INTRODUCTION TO STATISTICS AND MOVES ON TO COVER SOME BASIC DESCRIPTIVE STATISTICS CONCEPTS SUCH AS MEAN MEDIAN MODE ETC ? YOU WILL THEN EXPLORE THE CONCEPT OF PROBABILITY AND LOOK AT DIFFERENT TYPES OF PROBABILITY DISTRIBUTIONS NEXT YOU WILL LOOK AT PARAMETER ESTIMATIONS FOR THE UNKNOWN PARAMETERS PRESENT IN THE POPULATION AND LOOK AT RANDOM VARIABLES IN DETAIL WHICH ARE USED TO SAVE THE RESULTS OF AN EXPERIMENT IN STATISTICS YOU WILL THEN EXPLORE ONE OF THE MOST IMPORTANT FIELDS IN STATISTICS HYPOTHESIS TESTING AND THEN EXPLORE VARIOUS TYPES OF TESTS USED TO CHECK OUR HYPOTHESIS THE LAST PART OF OUR BOOK WILL FOCUS ON HOW YOU CAN PROCESS DATA USING

PYTHON SOME ELEMENTS OF NON PARAMETRIC STATISTICS AND FINALLY SOME INTRODUCTION TO MACHINE LEARNING ⁇ WHAT YOU WILL⁇ LEARN⁇ ⁇ UNDERSTAND THE BASICS OF STATISTICS GET TO KNOW MORE ABOUT DESCRIPTIVE STATISTICS UNDERSTAND AND LEARN ADVANCED STATISTICS TECHNIQUES LEARN HOW TO APPLY STATISTICAL CONCEPTS IN PYTHON UNDERSTAND IMPORTANT PYTHON PACKAGES FOR STATISTICS AND MACHINE LEARNING ⁇ WHO THIS BOOK IS FOR⁇ THIS BOOK IS FOR ANYONE WHO WANTS TO UNDERSTAND STATISTICS AND ITS USE IN MACHINE LEARNING THIS BOOK WILL HELP YOU UNDERSTAND THE MATHEMATICS BEHIND THE STATISTICAL CONCEPTS AND THE APPLICATIONS USING THE PYTHON LANGUAGE HAVING A WORKING KNOWLEDGE OF THE PYTHON LANGUAGE IS A PREREQUISITE TABLE OF CONTENTS⁇ 1 INTRODUCTION TO STATISTICS 2 DESCRIPTIVE STATISTICS 3 PROBABILITY 4 RANDOM VARIABLES 5 PARAMETER ESTIMATIONS 6 HYPOTHESIS TESTING 7 ANALYSIS OF VARIANCE 8 REGRESSION 9 NON PARAMETRIC STATISTICS 10 DATA ANALYSIS USING PYTHON 11 INTRODUCTION TO MACHINE LEARNING

BUILD MACHINE LEARNING MODELS WITH A SOUND STATISTICAL UNDERSTANDING ABOUT THIS BOOK LEARN ABOUT THE STATISTICS BEHIND POWERFUL PREDICTIVE MODELS WITH P VALUE ANOVA AND F STATISTICS IMPLEMENT STATISTICAL COMPUTATIONS PROGRAMMATICALLY FOR SUPERVISED AND UNSUPERVISED LEARNING THROUGH K MEANS CLUSTERING MASTER THE STATISTICAL ASPECT OF MACHINE LEARNING WITH THE HELP OF THIS EXAMPLE RICH GUIDE TO R AND PYTHON WHO THIS BOOK IS FORTHIS BOOK IS INTENDED FOR DEVELOPERS WITH LITTLE TO NO BACKGROUND IN STATISTICS WHO WANT TO IMPLEMENT MACHINE LEARNING IN THEIR SYSTEMS SOME PROGRAMMING KNOWLEDGE IN R OR PYTHON WILL BE USEFUL WHAT YOU WILL LEARN UNDERSTAND THE STATISTICAL AND MACHINE LEARNING FUNDAMENTALS NECESSARY TO BUILD MODELS UNDERSTAND THE MAJOR DIFFERENCES AND PARALLELS BETWEEN THE STATISTICAL WAY AND THE MACHINE LEARNING WAY TO SOLVE PROBLEMS LEARN HOW TO PREPARE DATA AND FEED MODELS BY USING THE APPROPRIATE MACHINE LEARNING ALGORITHMS FROM THE MORE THAN ADEQUATE R AND PYTHON PACKAGES ANALYZE THE RESULTS AND TUNE THE MODEL APPROPRIATELY TO YOUR OWN PREDICTIVE GOALS UNDERSTAND THE CONCEPTS OF REQUIRED STATISTICS FOR MACHINE LEARNING INTRODUCE YOURSELF TO NECESSARY FUNDAMENTALS REQUIRED FOR BUILDING SUPERVISED UNSUPERVISED DEEP LEARNING MODELS LEARN REINFORCEMENT LEARNING AND ITS APPLICATION IN THE FIELD OF ARTIFICIAL INTELLIGENCE DOMAININ DETAILCOMPLEX STATISTICS IN MACHINE LEARNING WORRY A LOT OF DEVELOPERS KNOWING STATISTICS HELPS YOU BUILD STRONG MACHINE LEARNING MODELS THAT ARE OPTIMIZED FOR A GIVEN PROBLEM STATEMENT THIS BOOK WILL TEACH YOU ALL IT TAKES TO PERFORM COMPLEX STATISTICAL COMPUTATIONS REQUIRED FOR MACHINE LEARNING YOU WILL GAIN INFORMATION ON STATISTICS BEHIND SUPERVISED LEARNING UNSUPERVISED LEARNING REINFORCEMENT LEARNING AND MORE UNDERSTAND THE REAL WORLD EXAMPLES THAT DISCUSS THE STATISTICAL SIDE OF MACHINE LEARNING AND FAMILIARIZE YOURSELF WITH IT YOU WILL ALSO DESIGN PROGRAMS FOR PERFORMING TASKS SUCH AS MODEL PARAMETER FITTING REGRESSION CLASSIFICATION DENSITY COLLECTION AND MORE BY THE END OF THE BOOK YOU WILL HAVE MASTERED THE REQUIRED STATISTICS FOR MACHINE LEARNING AND WILL BE ABLE TO APPLY YOUR NEW SKILLS TO ANY SORT OF INDUSTRY PROBLEM STYLE AND APPROACHTHIS PRACTICAL STEP BY STEP GUIDE WILL GIVE YOU AN UNDERSTANDING OF THE STATISTICAL AND MACHINE LEARNING FUNDAMENTALS YOU LL NEED TO BUILD MODELS

THIS BOOK PROVIDES A VERSATILE AND LUCID TREATMENT OF CLASSIC AS WELL AS MODERN PROBABILITY THEORY WHILE INTEGRATING THEM WITH CORE TOPICS IN STATISTICAL THEORY AND ALSO SOME KEY TOOLS IN MACHINE LEARNING IT IS WRITTEN IN AN EXTREMELY ACCESSIBLE STYLE WITH ELABORATE MOTIVATING DISCUSSIONS AND NUMEROUS WORKED OUT EXAMPLES AND EXERCISES THE BOOK HAS 20 CHAPTERS ON A WIDE RANGE OF TOPICS 423 WORKED OUT EXAMPLES AND 808 EXERCISES IT IS UNIQUE IN ITS UNIFICATION OF PROBABILITY AND STATISTICS ITS COVERAGE AND ITS SUPERB EXERCISE SETS DETAILED BIBLIOGRAPHY AND IN ITS SUBSTANTIVE TREATMENT OF MANY TOPICS OF CURRENT IMPORTANCE THIS BOOK CAN BE USED AS A TEXT FOR A YEAR LONG GRADUATE COURSE IN STATISTICS COMPUTER SCIENCE OR MATHEMATICS FOR SELF STUDY AND AS AN INVALUABLE RESEARCH REFERENCE ON PROBABILIITY AND ITS APPLICATIONS PARTICULARLY

WORTH MENTIONING ARE THE TREATMENTS OF DISTRIBUTION THEORY ASYMPTOTICS SIMULATION AND MARKOV CHAIN MONTE CARLO MARKOV CHAINS AND MARTINGALES GAUSSIAN PROCESSES VC THEORY PROBABILITY METRICS LARGE DEVIATIONS BOOTSTRAP THE EM ALGORITHM CONFIDENCE INTERVALS MAXIMUM LIKELIHOOD AND BAYES ESTIMATES EXPONENTIAL FAMILIES KERNELS AND HILBERT SPACES AND A SELF CONTAINED COMPLETE REVIEW OF UNIVARIATE PROBABILITY

TURN YOURSELF INTO A DATA HEAD YOU LL BECOME A MORE VALUABLE EMPLOYEE AND MAKE YOUR ORGANIZATION MORE SUCCESSFUL THOMAS H DAVENPORT RESEARCH FELLOW AUTHOR OF COMPETING ON ANALYTICS BIG DATA WORK AND THE AI ADVANTAGE YOU VE HEARD THE HYPE AROUND DATA NOW GET THE FACTS IN BECOMING A DATA HEAD HOW TO THINK SPEAK AND UNDERSTAND DATA SCIENCE STATISTICS AND MACHINE LEARNING AWARD WINNING DATA SCIENTISTS ALEX GUTMAN AND JORDAN GOLDMEIER PULL BACK THE CURTAIN ON DATA SCIENCE AND GIVE YOU THE LANGUAGE AND TOOLS NECESSARY TO TALK AND THINK CRITICALLY ABOUT IT YOU LL LEARN HOW TO THINK STATISTICALLY AND UNDERSTAND THE ROLE VARIATION PLAYS IN YOUR LIFE AND DECISION MAKING SPEAK INTELLIGENTLY AND ASK THE RIGHT QUESTIONS ABOUT THE STATISTICS AND RESULTS YOU ENCOUNTER IN THE WORKPLACE UNDERSTAND WHAT S REALLY GOING ON WITH MACHINE LEARNING TEXT ANALYTICS DEEP LEARNING AND ARTIFICIAL INTELLIGENCE AVOID COMMON PITFALLS WHEN WORKING WITH AND INTERPRETING DATA BECOMING A DATA HEAD IS A COMPLETE GUIDE FOR DATA SCIENCE IN THE WORKPLACE COVERING EVERYTHING FROM THE PERSONALITIES YOU LL WORK WITH TO THE MATH BEHIND THE ALGORITHMS THE AUTHORS HAVE SPENT YEARS IN DATA TRENCHES AND SOUGHT TO CREATE A FUN APPROACHABLE AND EMINENTLY READABLE BOOK ANYONE CAN BECOME A DATA HEAD AN ACTIVE PARTICIPANT IN DATA SCIENCE STATISTICS AND MACHINE LEARNING WHETHER YOU RE A BUSINESS PROFESSIONAL ENGINEER EXECUTIVE OR ASPIRING DATA SCIENTIST THIS BOOK IS FOR YOU

THE RECENT RAPID GROWTH IN THE VARIETY AND COMPLEXITY OF NEW MACHINE LEARNING ARCHITECTURES REQUIRES THE DEVELOPMENT OF IMPROVED METHODS FOR DESIGNING ANALYZING EVALUATING AND COMMUNICATING MACHINE LEARNING TECHNOLOGIES STATISTICAL MACHINE LEARNING A UNIFIED FRAMEWORK PROVIDES STUDENTS ENGINEERS AND SCIENTISTS WITH TOOLS FROM MATHEMATICAL STATISTICS AND NONLINEAR OPTIMIZATION THEORY TO BECOME EXPERTS IN THE FIELD OF MACHINE LEARNING IN PARTICULAR THE MATERIAL IN THIS TEXT DIRECTLY SUPPORTS THE MATHEMATICAL ANALYSIS AND DESIGN OF OLD NEW AND NOT YET INVENTED NONLINEAR HIGH DIMENSIONAL MACHINE LEARNING ALGORITHMS FEATURES UNIFIED EMPIRICAL RISK MINIMIZATION FRAMEWORK SUPPORTS RIGOROUS MATHEMATICAL ANALYSES OF WIDELY USED SUPERVISED UNSUPERVISED AND REINFORCEMENT MACHINE LEARNING ALGORITHMS MATRIX CALCULUS METHODS FOR SUPPORTING MACHINE LEARNING ANALYSIS AND DESIGN APPLICATIONS EXPLICIT CONDITIONS FOR ENSURING CONVERGENCE OF ADAPTIVE BATCH MINIBATCH MCEM AND MCMC LEARNING ALGORITHMS THAT MINIMIZE BOTH UNIMODAL AND MULTIMODAL OBJECTIVE FUNCTIONS EXPLICIT CONDITIONS FOR CHARACTERIZING ASYMPTOTIC PROPERTIES OF M ESTIMATORS AND MODEL SELECTION CRITERIA SUCH AS AIC AND BIC IN THE PRESENCE OF POSSIBLE MODEL MISSPECIFICATION THIS ADVANCED TEXT IS SUITABLE FOR GRADUATE STUDENTS OR HIGHLY MOTIVATED UNDERGRADUATE STUDENTS IN STATISTICS COMPUTER SCIENCE ELECTRICAL ENGINEERING AND APPLIED MATHEMATICS THE TEXT IS SELF CONTAINED AND ONLY ASSUMES KNOWLEDGE OF LOWER DIVISION LINEAR ALGEBRA AND UPPER DIVISION PROBABILITY THEORY STUDENTS PROFESSIONAL ENGINEERS AND MULTIDISCIPLINARY SCIENTISTS POSSESSING THESE MINIMAL PREREQUISITES WILL FIND THIS TEXT CHALLENGING YET ACCESSIBLE ABOUT THE AUTHOR RICHARD M GOLDEN PH D M S E E B S E E IS PROFESSOR OF COGNITIVE SCIENCE AND PARTICIPATING FACULTY MEMBER IN ELECTRICAL ENGINEERING AT THE UNIVERSITY OF TEXAS AT DALLAS DR GOLDEN HAS PUBLISHED ARTICLES AND GIVEN TALKS AT SCIENTIFIC CONFERENCES ON A WIDE RANGE OF TOPICS IN THE FIELDS OF BOTH STATISTICS AND MACHINE LEARNING OVER THE PAST THREE DECADES HIS LONG TERM RESEARCH INTERESTS INCLUDE IDENTIFYING CONDITIONS FOR THE CONVERGENCE OF DETERMINISTIC AND STOCHASTIC MACHINE LEARNING ALGORITHMS AND INVESTIGATING ESTIMATION AND INFERENCE IN THE PRESENCE OF POSSIBLY MISSPECIFIED PROBABILITY MODELS

MULTIBLOCK DATA FUSION IN STATISTICS AND MACHINE LEARNING EXPLORE THE ADVANTAGES AND SHORTCOMINGS OF VARIOUS FORMS OF MULTIBLOCK ANALYSIS AND THE RELATIONSHIPS BETWEEN THEM WITH THIS EXPERT GUIDE ARISING OUT OF FUSION PROBLEMS THAT EXIST IN A VARIETY OF FIELDS IN THE NATURAL AND LIFE SCIENCES THE METHODS AVAILABLE TO FUSE MULTIPLE DATA SETS HAVE EXPANDED DRAMATICALLY IN RECENT YEARS OLDER METHODS ROOTED IN PSYCHOMETRICS AND CHEMOMETRICS ALSO EXIST MULTIBLOCK DATA FUSION IN STATISTICS AND MACHINE LEARNING APPLICATIONS IN THE NATURAL AND LIFE SCIENCES IS A DETAILED OVERVIEW OF ALL RELEVANT MULTIBLOCK DATA ANALYSIS METHODS FOR FUSING MULTIPLE DATA SETS IT FOCUSES ON METHODS BASED ON COMPONENTS AND LATENT VARIABLES INCLUDING BOTH WELL KNOWN AND LESSER KNOWN METHODS WITH POTENTIAL APPLICATIONS IN DIFFERENT TYPES OF PROBLEMS MANY OF THE INCLUDED METHODS ARE ILLUSTRATED BY PRACTICAL EXAMPLES AND ARE ACCOMPANIED BY A FREELY AVAILABLE R PACKAGE THE DISTINGUISHED AUTHORS HAVE CREATED AN ACCESSIBLE AND USEFUL GUIDE TO HELP READERS FUSE DATA DEVELOP NEW DATA FUSION MODELS DISCOVER HOW THE INVOLVED ALGORITHMS AND MODELS WORK AND UNDERSTAND THE ADVANTAGES AND SHORTCOMINGS OF VARIOUS APPROACHES THIS BOOK INCLUDES A THOROUGH INTRODUCTION TO THE DIFFERENT OPTIONS AVAILABLE FOR THE FUSION OF MULTIPLE DATA SETS INCLUDING METHODS ORIGINATING IN PSYCHOMETRICS AND CHEMOMETRICS PRACTICAL DISCUSSIONS OF WELL KNOWN AND LESSER KNOWN METHODS WITH APPLICATIONS IN A WIDE VARIETY OF DATA PROBLEMS INCLUDED FUNCTIONAL R CODE FOR THE APPLICATION OF MANY OF THE DISCUSSED METHODS PERFECT FOR GRADUATE STUDENTS STUDYING DATA ANALYSIS IN THE CONTEXT OF THE NATURAL AND LIFE SCIENCES INCLUDING BIOINFORMATICS SENSOMETRICS AND CHEMOMETRICS MULTIBLOCK DATA FUSION IN STATISTICS AND MACHINE LEARNING APPLICATIONS IN THE NATURAL AND LIFE SCIENCES IS ALSO AN INDISPENSABLE RESOURCE FOR DEVELOPERS AND USERS OF THE RESULTS OF MULTIBLOCK METHODS

MACHINE LEARNING ALLOWS COMPUTERS TO LEARN AND DISCERN PATTERNS WITHOUT BEING PROGRAMMED WHEN STATISTICAL TECHNIQUES AND MACHINE LEARNING ARE COMBINED TOGETHER THEY ARE A POWERFUL TOOL FOR ANALYZING VARIOUS KINDS OF DATA IN MANY COMPUTER SCIENCE ENGINEERING AREAS INCLUDING IMAGE PROCESSING SPEECH PROCESSING NATURAL LANGUAGE PROCESSING ROBOT CONTROL AS WELL AS IN FUNDAMENTAL SCIENCES SUCH AS BIOLOGY MEDICINE ASTRONOMY PHYSICS AND MATERIALS INTRODUCTION TO STATISTICAL MACHINE LEARNING SECOND EDITION PROVIDES A GENERAL INTRODUCTION TO MACHINE LEARNING THAT COVERS A WIDE RANGE OF TOPICS CONCISELY AND WILL HELP READERS BRIDGE THE GAP BETWEEN THEORY AND PRACTICE PARTS 1 AND 2 DISCUSS THE FUNDAMENTAL CONCEPTS OF STATISTICS AND PROBABILITY THAT ARE USED IN DESCRIBING MACHINE LEARNING ALGORITHMS PART 3 AND PART 4 EXPLAIN THE TWO MAJOR APPROACHES OF MACHINE LEARNING TECHNIQUES GENERATIVE METHODS AND DISCRIMINATIVE METHODS WHILE PARTS 5 AND 6 PROVIDE AN IN DEPTH LOOK AT ADVANCED TOPICS THAT PLAY ESSENTIAL ROLES IN MAKING MACHINE LEARNING ALGORITHMS MORE USEFUL IN PRACTICE INCLUDING CREATING FULL FLEDGED ALGORITHMS IN A RANGE OF REAL WORLD APPLICATIONS DRAWN FROM RESEARCH AREAS SUCH AS IMAGE PROCESSING SPEECH PROCESSING NATURAL LANGUAGE PROCESSING ROBOT CONTROL AS WELL AS BIOLOGY MEDICINE ASTRONOMY PHYSICS AND MATERIALS THE ALGORITHMS DEVELOPED IN THE BOOK INCLUDE PYTHON PROGRAM CODE TO PROVIDE YOU WITH THE NECESSARY PRACTICAL SKILLS NEEDED TO ACCOMPLISH A WIDE RANGE OF DATA ANALYSIS TASKS THE SECOND EDITION ALSO INCLUDES AN ALL NEW PART 6 ON ON DEEP LEARNING INCLUDING CHAPTERS ON FEEDFORWARD NEURAL NETWORKS NEURAL NETWORKS WITH IMAGE DATA NEURAL NETWORKS WITH SEQUENTIAL DATA LEARNING FROM LIMITED DATA REPRESENTATION LEARNING DEEP GENERATIVE MODELING AND MULTIMODAL LEARNING PROVIDES THE NECESSARY BACKGROUND MATERIAL TO UNDERSTAND MACHINE LEARNING SUCH ASSTATISTICS PROBABILITY LINEAR ALGEBRA AND CALCULUS COMPLETE COVERAGE OF THE GENERATIVE APPROACH TO STATISTICAL PATTERN RECOGNITION AND THE DISCRIMINATIVE APPROACH TO STATISTICAL MACHINE LEARNING INCLUDES PYTHON PROGRAM CODE SO THAT READERS CAN TEST THE ALGORITHMS NUMERICALLY AND ACQUIRE BOTH MATHEMATICAL AND PRACTICAL SKILLS IN A WIDE RANGE OF DATA ANALYSIS TASKS DISCUSSES A WIDE RANGE OF APPLICATIONS IN MACHINE LEARNING AND STATISTICS AND PROVIDES EXAMPLES DRAWN FROM IMAGE PROCESSING SPEECH PROCESSING

NATURAL LANGUAGE PROCESSING ROBOT CONTROL AS WELL AS BIOLOGY MEDICINE ASTRONOMY PHYSICS AND MATERIALS

THIS BOOK FULLY UPDATED FOR PYTHON VERSION 3 6 COVERS THE KEY IDEAS THAT LINK PROBABILITY STATISTICS AND MACHINE LEARNING ILLUSTRATED USING PYTHON MODULES IN THESE AREAS ALL THE FIGURES AND NUMERICAL RESULTS ARE REPRODUCIBLE USING THE PYTHON CODES PROVIDED THE AUTHOR DEVELOPS KEY INTUITIONS IN MACHINE LEARNING BY WORKING MEANINGFUL EXAMPLES USING MULTIPLE ANALYTICAL METHODS AND PYTHON CODES THEREBY CONNECTING THEORETICAL CONCEPTS TO CONCRETE IMPLEMENTATIONS DETAILED PROOFS FOR CERTAIN IMPORTANT RESULTS ARE ALSO PROVIDED MODERN PYTHON MODULES LIKE PANDAS SYMPY SCIKIT LEARN TENSORFLOW AND KERAS ARE APPLIED TO SIMULATE AND VISUALIZE IMPORTANT MACHINE LEARNING CONCEPTS LIKE THE BIAS VARIANCE TRADE OFF CROSS VALIDATION AND REGULARIZATION MANY ABSTRACT MATHEMATICAL IDEAS SUCH AS CONVERGENCE IN PROBABILITY THEORY ARE DEVELOPED AND ILLUSTRATED WITH NUMERICAL EXAMPLES THIS UPDATED EDITION NOW INCLUDES THE FISHER EXACT TEST AND THE MANN WHITNEY WILCOXON TEST A NEW SECTION ON SURVIVAL ANALYSIS HAS BEEN INCLUDED AS WELL AS SUBSTANTIAL DEVELOPMENT OF GENERALIZED LINEAR MODELS THE NEW DEEP LEARNING SECTION FOR IMAGE PROCESSING INCLUDES AN IN DEPTH DISCUSSION OF GRADIENT DESCENT METHODS THAT UNDERPIN ALL DEEP LEARNING ALGORITHMS AS WITH THE PRIOR EDITION THERE ARE NEW AND UPDATED PROGRAMMING TIPS THAT THE ILLUSTRATE EFFECTIVE PYTHON MODULES AND METHODS FOR SCIENTIFIC PROGRAMMING AND MACHINE LEARNING THERE ARE 445 RUN ABLE CODE BLOCKS WITH CORRESPONDING OUTPUTS THAT HAVE BEEN TESTED FOR ACCURACY OVER 158 GRAPHICAL VISUALIZATIONS ALMOST ALL GENERATED USING PYTHON ILLUSTRATE THE CONCEPTS THAT ARE DEVELOPED BOTH IN CODE AND IN MATHEMATICS WE ALSO DISCUSS AND USE KEY PYTHON MODULES SUCH AS NUMPY SCIKIT LEARN SYMPY SCIPY LIFELINES CVXPY THEANO MATPLOTLIB PANDAS TENSORFLOW STATSMODELS AND KERAS THIS BOOK IS SUITABLE FOR ANYONE WITH AN UNDERGRADUATE LEVEL EXPOSURE TO PROBABILITY STATISTICS OR MACHINE LEARNING AND WITH RUDIMENTARY KNOWLEDGE OF PYTHON PROGRAMMING

THE USE OF ELECTRONIC HEALTH RECORDS EHR ELECTRONIC MEDICAL RECORDS EMR DATA IS BECOMING MORE PREVALENT FOR RESEARCH HOWEVER ANALYSIS OF THIS TYPE OF DATA HAS MANY UNIQUE COMPLICATIONS DUE TO HOW THEY ARE COLLECTED PROCESSED AND TYPES OF QUESTIONS THAT CAN BE ANSWERED THIS BOOK COVERS MANY IMPORTANT TOPICS RELATED TO USING EHR EMR DATA FOR RESEARCH INCLUDING DATA EXTRACTION CLEANING PROCESSING ANALYSIS INFERENCE AND PREDICTIONS BASED ON MANY YEARS OF PRACTICAL EXPERIENCE OF THE AUTHORS THE BOOK CAREFULLY EVALUATES AND COMPARES THE STANDARD STATISTICAL MODELS AND APPROACHES WITH THOSE OF MACHINE LEARNING AND DEEP LEARNING METHODS AND REPORTS THE UNBIASED COMPARISON RESULTS FOR THESE METHODS IN PREDICTING CLINICAL OUTCOMES BASED ON THE EHR DATA KEY FEATURES WRITTEN BASED ON HANDS ON EXPERIENCE OF CONTRIBUTORS FROM MULTIDISCIPLINARY EHR RESEARCH PROJECTS WHICH INCLUDE METHODS AND APPROACHES FROM STATISTICS COMPUTING INFORMATICS DATA SCIENCE AND CLINICAL EPIDEMIOLOGICAL DOMAINS DOCUMENTS THE DETAILED EXPERIENCE ON EHR DATA EXTRACTION CLEANING AND PREPARATION PROVIDES A BROAD VIEW OF STATISTICAL APPROACHES AND MACHINE LEARNING PREDICTION MODELS TO DEAL WITH THE CHALLENGES AND LIMITATIONS OF EHR DATA CONSIDERS THE COMPLETE CYCLE OF EHR DATA ANALYSIS THE USE OF EHR EMR ANALYSIS REQUIRES CLOSE COLLABORATIONS BETWEEN STATISTICIANS INFORMATICIANS DATA SCIENTISTS AND CLINICAL EPIDEMIOLOGICAL INVESTIGATORS THIS BOOK REFLECTS THAT MULTIDISCIPLINARY PERSPECTIVE

DATA ANALYSIS MACHINE LEARNING AND KNOWLEDGE DISCOVERY ARE RESEARCH AREAS AT THE INTERSECTION OF COMPUTER SCIENCE ARTIFICIAL INTELLIGENCE MATHEMATICS AND STATISTICS THEY COVER GENERAL METHODS AND TECHNIQUES THAT CAN BE APPLIED TO A VAST SET OF APPLICATIONS SUCH AS WEB AND TEXT MINING MARKETING MEDICINE BIOINFORMATICS AND BUSINESS INTELLIGENCE THIS VOLUME CONTAINS THE REVISED VERSIONS OF SELECTED PAPERS IN THE FIELD OF DATA ANALYSIS MACHINE LEARNING AND KNOWLEDGE

DISCOVERY PRESENTED DURING THE 36TH ANNUAL CONFERENCE OF THE GERMAN CLASSIFICATION SOCIETY GFKL THE CONFERENCE WAS HELD AT THE UNIVERSITY OF HILDESHEIM GERMANY IN AUGUST 2012

STATISTICS IS A PILLAR OF MACHINE LEARNING YOU CANNOT DEVELOP A DEEP UNDERSTANDING AND APPLICATION OF MACHINE LEARNING WITHOUT IT CUT THROUGH THE EQUATIONS GREEK LETTERS AND CONFUSION AND DISCOVER THE TOPICS IN STATISTICS THAT YOU NEED TO KNOW USING CLEAR EXPLANATIONS STANDARD PYTHON LIBRARIES AND STEP BY STEP TUTORIAL LESSONS YOU WILL DISCOVER THE IMPORTANCE OF STATISTICAL METHODS TO MACHINE LEARNING SUMMARY STATS HYPOTHESIS TESTING NONPARAMETRIC STATS RESAMPLING METHODS AND MUCH MORE

TIME SERIES DATA ANALYSIS IS INCREASINGLY IMPORTANT DUE TO THE MASSIVE PRODUCTION OF SUCH DATA THROUGH THE INTERNET OF THINGS THE DIGITALIZATION OF HEALTHCARE AND THE RISE OF SMART CITIES AS CONTINUOUS MONITORING AND DATA COLLECTION BECOME MORE COMMON THE NEED FOR COMPETENT TIME SERIES ANALYSIS WITH BOTH STATISTICAL AND MACHINE LEARNING TECHNIQUES WILL INCREASE COVERING INNOVATIONS IN TIME SERIES DATA ANALYSIS AND USE CASES FROM THE REAL WORLD THIS PRACTICAL GUIDE WILL HELP YOU SOLVE THE MOST COMMON DATA ENGINEERING AND ANALYSIS CHALLENGESIN TIME SERIES USING BOTH TRADITIONAL STATISTICAL AND MODERN MACHINE LEARNING TECHNIQUES AUTHOR AILEEN NIELSEN OFFERS AN ACCESSIBLE WELL ROUNDED INTRODUCTION TO TIME SERIES IN BOTH R AND PYTHON THAT WILL HAVE DATA SCIENTISTS SOFTWARE ENGINEERS AND RESEARCHERS UP AND RUNNING QUICKLY YOU LL GET THE GUIDANCE YOU NEED TO CONFIDENTLY FIND AND WRANGLE TIME SERIES DATA UNDERTAKE EXPLORATORY TIME SERIES DATA ANALYSIS STORE TEMPORAL DATA SIMULATE TIME SERIES DATA GENERATE AND SELECT FEATURES FOR A TIME SERIES MEASURE ERROR FORECAST AND CLASSIFY TIME SERIES WITH MACHINE OR DEEP LEARNING EVALUATE ACCURACY AND PERFORMANCE

THE MODELING AND PROCESSING OF EMPIRICAL DATA IS ONE OF THE MAIN SUBJECTS AND GOALS OF STATISTICS NOWADAYS WITH THE DEVELOPMENT OF COMPUTER SCIENCE THE EXTRACTION OF USEFUL AND OFTEN HIDDEN INFORMATION AND PATTERNS FROM DATA SETS OF DIFFERENT VOLUMES AND COMPLEX DATA SETS IN WAREHOUSES HAS BEEN ADDED TO THESE GOALS NEW AND POWERFUL STATISTICAL TECHNIQUES WITH MACHINE LEARNING ML AND DATA MINING PARADIGMS HAVE BEEN DEVELOPED TO ONE DEGREE OR ANOTHER ALL OF THESE TECHNIQUES AND ALGORITHMS ORIGINATE FROM A RIGOROUS MATHEMATICAL BASIS INCLUDING PROBABILITY THEORY AND MATHEMATICAL STATISTICS OPERATIONAL RESEARCH MATHEMATICAL ANALYSIS NUMERICAL METHODS ETC POPULAR ML METHODS SUCH AS ARTIFICIAL NEURAL NETWORKS ANN SUPPORT VECTOR MACHINES SVM DECISION TREES RANDOM FOREST RF AMONG OTHERS HAVE GENERATED MODELS THAT CAN BE CONSIDERED AS STRAIGHTFORWARD APPLICATIONS OF OPTIMIZATION THEORY AND STATISTICAL ESTIMATION THE WIDE ARSENAL OF CLASSICAL STATISTICAL APPROACHES COMBINED WITH POWERFUL ML TECHNIQUES ALLOWS MANY CHALLENGING AND PRACTICAL PROBLEMS TO BE SOLVED THIS SPECIAL ISSUE BELONGS TO THE SECTION MATHEMATICS AND COMPUTER SCIENCE ITS AIM IS TO ESTABLISH A BRIEF COLLECTION OF CAREFULLY SELECTED PAPERS PRESENTING NEW AND ORIGINAL METHODS DATA ANALYSES CASE STUDIES COMPARATIVE STUDIES AND OTHER RESEARCH ON THE TOPIC OF STATISTICAL DATA MODELING AND ML AS WELL AS THEIR APPLICATIONS PARTICULAR ATTENTION IS GIVEN BUT IS NOT LIMITED TO THEORIES AND APPLICATIONS IN DIVERSE AREAS SUCH AS COMPUTER SCIENCE MEDICINE ENGINEERING BANKING EDUCATION SOCIOLOGY ECONOMICS AMONG OTHERS THE RESULTING PALETTE OF METHODS ALGORITHMS AND APPLICATIONS FOR STATISTICAL MODELING AND ML PRESENTED IN THIS SPECIAL ISSUE IS EXPECTED TO CONTRIBUTE TO THE FURTHER DEVELOPMENT OF RESEARCH IN THIS AREA WE ALSO BELIEVE THAT THE NEW KNOWLEDGE ACQUIRED HERE AS WELL AS THE APPLIED RESULTS ARE ATTRACTIVE AND USEFUL FOR YOUNG SCIENTISTS DOCTORAL STUDENTS AND RESEARCHERS FROM VARIOUS SCIENTIFIC SPECIALTIES

GET YOUR STATISTICS BASICS RIGHT BEFORE DIVING INTO THE WORLD OF DATA SCIENCE ABOUT THIS BOOK

NO NEED TO TAKE A DEGREE IN STATISTICS READ THIS BOOK AND GET A STRONG STATISTICS BASE FOR DATA SCIENCE AND REAL WORLD PROGRAMS IMPLEMENT STATISTICS IN DATA SCIENCE TASKS SUCH AS DATA CLEANING MINING AND ANALYSIS LEARN ALL ABOUT PROBABILITY STATISTICS NUMERICAL COMPUTATIONS AND MORE WITH THE HELP OF R PROGRAMS WHO THIS BOOK IS FOR THIS BOOK IS INTENDED FOR THOSE DEVELOPERS WHO ARE WILLING TO ENTER THE FIELD OF DATA SCIENCE AND ARE LOOKING FOR CONCISE INFORMATION OF STATISTICS WITH THE HELP OF INSIGHTFUL PROGRAMS AND SIMPLE EXPLANATION SOME BASIC HANDS ON R WILL BE USEFUL WHAT YOU WILL LEARN ANALYZE THE TRANSITION FROM A DATA DEVELOPER TO A DATA SCIENTIST MINDSET GET ACQUAINTED WITH THE R PROGRAMS AND THE LOGIC USED FOR STATISTICAL COMPUTATIONS UNDERSTAND MATHEMATICAL CONCEPTS SUCH AS VARIANCE STANDARD DEVIATION PROBABILITY MATRIX CALCULATIONS AND MORE LEARN TO IMPLEMENT STATISTICS IN DATA SCIENCE TASKS SUCH AS DATA CLEANING MINING AND ANALYSIS LEARN THE STATISTICAL TECHNIQUES REQUIRED TO PERFORM TASKS SUCH AS LINEAR REGRESSION REGULARIZATION MODEL ASSESSMENT BOOSTING SVMS AND WORKING WITH NEURAL NETWORKS GET COMFORTABLE WITH PERFORMING VARIOUS STATISTICAL COMPUTATIONS FOR DATA SCIENCE PROGRAMMATICALLY IN DETAIL DATA SCIENCE IS AN EVER EVOLVING FIELD WHICH IS GROWING IN POPULARITY AT AN EXPONENTIAL RATE DATA SCIENCE INCLUDES TECHNIQUES AND THEORIES EXTRACTED FROM THE FIELDS OF STATISTICS COMPUTER SCIENCE AND MOST IMPORTANTLY MACHINE LEARNING DATABASES DATA VISUALIZATION AND SO ON THIS BOOK TAKES YOU THROUGH AN ENTIRE JOURNEY OF STATISTICS FROM KNOWING VERY LITTLE TO BECOMING COMFORTABLE IN USING VARIOUS STATISTICAL METHODS FOR DATA SCIENCE TASKS IT STARTS OFF WITH SIMPLE STATISTICS AND THEN MOVE ON TO STATISTICAL METHODS THAT ARE USED IN DATA SCIENCE ALGORITHMS THE R PROGRAMS FOR STATISTICAL COMPUTATION ARE CLEARLY EXPLAINED ALONG WITH LOGIC YOU WILL COME ACROSS VARIOUS MATHEMATICAL CONCEPTS SUCH AS VARIANCE STANDARD DEVIATION PROBABILITY MATRIX CALCULATIONS AND MORE YOU WILL LEARN ONLY WHAT IS REQUIRED TO IMPLEMENT STATISTICS IN DATA SCIENCE TASKS SUCH AS DATA CLEANING MINING AND ANALYSIS YOU WILL LEARN THE STATISTICAL TECHNIQUES REQUIRED TO PERFORM TASKS SUCH AS LINEAR REGRESSION REGULARIZATION MODEL ASSESSMENT BOOSTING SVMS AND WORKING WITH NEURAL NETWORKS BY THE END OF THE BOOK YOU WILL BE COMFORTABLE WITH PERFORMING VARIOUS STATISTICAL COMPUTATIONS FOR DATA SCIENCE PROGRAMMATICALLY STYLE AND APPROACH STEP BY STEP COMPREHENSIVE GUIDE WITH REAL WORLD EXAMPLES

THIS MONOGRAPH USES THE JULIA LANGUAGE TO GUIDE THE READER THROUGH AN EXPLORATION OF THE FUNDAMENTAL CONCEPTS OF PROBABILITY AND STATISTICS ALL WITH A VIEW OF MASTERING MACHINE LEARNING DATA SCIENCE AND ARTIFICIAL INTELLIGENCE THE TEXT DOES NOT REQUIRE ANY PRIOR STATISTICAL KNOWLEDGE AND ONLY ASSUMES A BASIC UNDERSTANDING OF PROGRAMMING AND MATHEMATICAL NOTATION IT IS ACCESSIBLE TO PRACTITIONERS AND RESEARCHERS IN DATA SCIENCE MACHINE LEARNING BIO STATISTICS FINANCE OR ENGINEERING WHO MAY WISH TO SOLIDIFY THEIR KNOWLEDGE OF PROBABILITY AND STATISTICS THE BOOK PROGRESSES THROUGH TEN INDEPENDENT CHAPTERS STARTING WITH AN INTRODUCTION OF JULIA AND MOVING THROUGH BASIC PROBABILITY DISTRIBUTIONS STATISTICAL INFERENCE REGRESSION ANALYSIS MACHINE LEARNING METHODS AND THE USE OF MONTE CARLO SIMULATION FOR DYNAMIC STOCHASTIC MODELS ULTIMATELY THIS TEXT INTRODUCES THE JULIA PROGRAMMING LANGUAGE AS A COMPUTATIONAL TOOL UNIQUELY ADDRESSING END USERS RATHER THAN DEVELOPERS IT MAKES HEAVY USE OF OVER 200 CODE EXAMPLES TO ILLUSTRATE DOZENS OF KEY STATISTICAL CONCEPTS THE JULIA CODE WRITTEN IN A SIMPLE FORMAT WITH PARAMETERS THAT CAN BE EASILY MODIFIED IS ALSO AVAILABLE FOR DOWNLOAD FROM THE BOOK S ASSOCIATED GITHUB REPOSITORY ONLINE SEE WHAT CO CREATORS OF THE JULIA LANGUAGE ARE SAYING ABOUT THE BOOK PROFESSOR ALAN EDELMAN MIT WITH STATISTICS WITH JULIA YONI AND HAYDEN HAVE WRITTEN AN EASY TO READ WELL ORGANIZED MODERN INTRODUCTION TO STATISTICS THE CODE MAY BE LOOKED AT AND UNDERSTOOD ON THE STATIC PAGES OF A BOOK OR EVEN BETTER WHEN RUNNING LIVE ON A COMPUTER EVERYTHING YOU NEED IS HERE IN ONE NICELY WRITTEN SELF CONTAINED REFERENCE DR VIRAL SHAH CEO OF JULIA COMPUTING YONI AND HAYDEN PROVIDE A MODERN WAY TO LEARN STATISTICS WITH THE JULIA

PROGRAMMING LANGUAGE THIS BOOK HAS BEEN PERFECTED THROUGH ITERATION OVER SEVERAL SEMESTERS IN THE CLASSROOM IT PREPARES THE READER WITH TWO COMPLEMENTARY SKILLS STATISTICAL REASONING WITH HANDS ON EXPERIENCE AND WORKING WITH LARGE DATASETS THROUGH TRAINING IN JULIA

THE AMOUNT OF DATA MEDICAL DATABASES DOUBLES EVERY 20 MONTHS AND PHYSICIANS ARE AT A LOSS TO ANALYZE THEM ALSO TRADITIONAL DATA ANALYSIS HAS DIFFICULTY TO IDENTIFY OUTLIERS AND PATTERNS IN BIG DATA AND DATA WITH MULTIPLE EXPOSURE OUTCOME VARIABLES AND ANALYSIS RULES FOR SURVEYS AND QUESTIONNAIRES CURRENTLY COMMON METHODS OF DATA COLLECTION ARE ESSENTIALLY MISSING CONSEQUENTLY PROPER DATA BASED HEALTH DECISIONS WILL SOON BE IMPOSSIBLE OBVIOUSLY IT IS TIME THAT MEDICAL AND HEALTH PROFESSIONALS MASTERED THEIR RELUCTANCE TO USE MACHINE LEARNING METHODS AND THIS WAS THE MAIN INCENTIVE FOR THE AUTHORS TO COMPLETE A SERIES OF THREE TEXTBOOKS ENTITLED MACHINE LEARNING IN MEDICINE PART ONE TWO AND THREE SPRINGER HEIDELBERG GERMANY 2012 2013 DESCRIBING IN A NONMATHEMATICAL WAY OVER SIXTY MACHINE LEARNING METHODOLOGIES AS AVAILABLE IN SPSS STATISTICAL SOFTWARE AND OTHER MAJOR SOFTWARE PROGRAMS ALTHOUGH WELL RECEIVED IT CAME TO OUR ATTENTION THAT PHYSICIANS AND STUDENTS OFTEN LACKED TIME TO READ THE ENTIRE BOOKS AND REQUESTED A SMALL BOOK WITHOUT BACKGROUND INFORMATION AND THEORETICAL DISCUSSIONS AND HIGHLIGHTING TECHNICAL DETAILS FOR THIS REASON WE PRODUCED A 100 PAGE COOKBOOK ENTITLED MACHINE LEARNING IN MEDICINE COOKBOOK ONE WITH DATA EXAMPLES AVAILABLE AT EXTRAS SPRINGER COM FOR SELF ASSESSMENT AND WITH REFERENCE TO THE ABOVE TEXTBOOKS FOR BACKGROUND INFORMATION ALREADY AT THE COMPLETION OF THIS COOKBOOK WE CAME TO REALIZE THAT MANY ESSENTIAL METHODS WERE NOT COVERED THE CURRENT VOLUME ENTITLED MACHINE LEARNING IN MEDICINE COOKBOOK TWO IS COMPLEMENTARY TO THE FIRST AND ALSO INTENDED FOR PROVIDING A MORE BALANCED VIEW OF THE FIELD AND THUS AS A MUST READ NOT ONLY FOR PHYSICIANS AND STUDENTS BUT ALSO FOR ANY ONE INVOLVED IN THE PROCESS AND PROGRESS OF HEALTH AND HEALTH CARE SIMILARLY TO MACHINE LEARNING IN MEDICINE COOKBOOK ONE THE CURRENT WORK WILL DESCRIBE STEPWISE ANALYSES OF OVER TWENTY MACHINE LEARNING METHODS THAT ARE LIKEWISE BASED ON THE THREE MAJOR MACHINE LEARNING METHODOLOGIES CLUSTER METHODOLOGIES CHAPS 1 3 LINEAR METHODOLOGIES CHAPS 4 11 RULES METHODOLOGIES CHAPS 12 20 IN EXTRAS SPRINGER COM THE DATA FILES OF THE EXAMPLES ARE GIVEN AS WELL AS XML EXTENDED MARK UP LANGUAGE SPS SYNTAX AND ZIP COMPRESSED FILES FOR OUTCOME PREDICTIONS IN FUTURE PATIENTS IN ADDITION TO CONDENSED VERSIONS OF THE METHODS FULLY DESCRIBED IN THE ABOVE THREE TEXTBOOKS AN INTRODUCTION IS GIVEN TO SPSS MODELER SPSS DATA MINING WORKBENCH IN THE CHAPS 15 18 19 WHILE IMPROVED STATISTICAL METHODS LIKE VARIOUS AUTOMATED ANALYSES AND MONTE CARLO SIMULATION MODELS ARE IN THE CHAPS 1 5 7 AND 8 WE SHOULD EMPHASIZE THAT ALL OF THE METHODS DESCRIBED HAVE BEEN SUCCESSFULLY APPLIED IN PRACTICE BY THE AUTHORS BOTH OF THEM PROFESSORS IN APPLIED STATISTICS AND MACHINE LEARNING AT THE EUROPEAN COMMUNITY COLLEGE OF PHARMACEUTICAL MEDICINE IN LYON FRANCE WE RECOMMEND THE CURRENT WORK NOT ONLY AS A TRAINING COMPANION TO INVESTIGATORS AND STUDENTS BECAUSE OF PLENTY OF STEP BY STEP ANALYSES GIVEN BUT ALSO AS A BRIEF INTRODUCTORY TEXT TO JADED CLINICIANS NEW TO THE METHODS FOR THE LATTER PURPOSE BACKGROUND AND THEORETICAL INFORMATION HAVE BEEN REPLACED WITH THE APPROPRIATE REFERENCES TO THE ABOVE TEXTBOOKS WHILE SINGLE SECTIONS ADDRESSING GENERAL PURPOSES MAIN SCIENTIFIC QUESTIONS AND CONCLUSIONS ARE GIVEN IN PLACE FINALLY WE WILL DEMONSTRATE THAT MODERN MACHINE LEARNING PERFORMS SOMETIMES BETTER THAN TRADITIONAL STATISTICS DOES MACHINE LEARNING MAY HAVE LITTLE OPTIONS FOR ADJUSTING CONFOUNDING AND INTERACTION BUT YOU CAN ADD PROPENSITY SCORES AND INTERACTION VARIABLES TO ALMOST ANY MACHINE LEARNING METHOD

DURING THE PAST DECADE THERE HAS BEEN AN EXPLOSION IN COMPUTATION AND INFORMATION TECHNOLOGY WITH IT HAVE COME VAST AMOUNTS OF DATA IN A VARIETY OF FIELDS SUCH AS MEDICINE BIOLOGY FINANCE AND MARKETING THE CHALLENGE OF UNDERSTANDING THESE DATA HAS LED TO THE DEVELOPMENT OF NEW

TOOLS IN THE FIELD OF STATISTICS AND SPAWNED NEW AREAS SUCH AS DATA MINING MACHINE LEARNING AND BIOINFORMATICS MANY OF THESE TOOLS HAVE COMMON UNDERPINNINGS BUT ARE OFTEN EXPRESSED WITH DIFFERENT TERMINOLOGY THIS BOOK DESCRIBES THE IMPORTANT IDEAS IN THESE AREAS IN A COMMON CONCEPTUAL FRAMEWORK WHILE THE APPROACH IS STATISTICAL THE EMPHASIS IS ON CONCEPTS RATHER THAN MATHEMATICS MANY EXAMPLES ARE GIVEN WITH A LIBERAL USE OF COLOR GRAPHICS IT SHOULD BE A VALUABLE RESOURCE FOR STATISTICIANS AND ANYONE INTERESTED IN DATA MINING IN SCIENCE OR INDUSTRY THE BOOK S COVERAGE IS BROAD FROM SUPERVISED LEARNING PREDICTION TO UNSUPERVISED LEARNING THE MANY TOPICS INCLUDE NEURAL NETWORKS SUPPORT VECTOR MACHINES CLASSIFICATION TREES AND BOOSTING THE FIRST COMPREHENSIVE TREATMENT OF THIS TOPIC IN ANY BOOK THIS MAJOR NEW EDITION FEATURES MANY TOPICS NOT COVERED IN THE ORIGINAL INCLUDING GRAPHICAL MODELS RANDOM FORESTS ENSEMBLE METHODS LEAST ANGLE REGRESSION PATH ALGORITHMS FOR THE LASSO NON NEGATIVE MATRIX FACTORIZATION AND SPECTRAL CLUSTERING THERE IS ALSO A CHAPTER ON METHODS FOR WIDE DATA P BIGGER THAN N INCLUDING MULTIPLE TESTING AND FALSE DISCOVERY RATES TREVOR HASTIE ROBERT TIBSHIRANI AND JEROME FRIEDMAN ARE PROFESSORS OF STATISTICS AT STANFORD UNIVERSITY THEY ARE PROMINENT RESEARCHERS IN THIS AREA HASTIE AND TIBSHIRANI DEVELOPED GENERALIZED ADDITIVE MODELS AND WROTE A POPULAR BOOK OF THAT TITLE HASTIE CO DEVELOPED MUCH OF THE STATISTICAL MODELING SOFTWARE AND ENVIRONMENT IN R S PLUS AND INVENTED PRINCIPAL CURVES AND SURFACES TIBSHIRANI PROPOSED THE LASSO AND IS CO AUTHOR OF THE VERY SUCCESSFUL AN INTRODUCTION TO THE BOOTSTRAP FRIEDMAN IS THE CO INVENTOR OF MANY DATA MINING TOOLS INCLUDING CART MARS PROJECTION PURSUIT AND GRADIENT BOOSTING

STATISTICAL LEARNING AND ANALYSIS TECHNIQUES HAVE BECOME EXTREMELY IMPORTANT TODAY GIVEN THE TREMENDOUS GROWTH IN THE SIZE OF HETEROGENEOUS DATA COLLECTIONS AND THE ABILITY TO PROCESS IT EVEN FROM PHYSICALLY DISTANT LOCATIONS RECENT ADVANCES MADE IN THE FIELD OF MACHINE LEARNING PROVIDE A STRONG FRAMEWORK FOR ROBUST LEARNING FROM THE DIVERSE CORPORA AND CONTINUE TO IMPACT A VARIETY OF RESEARCH PROBLEMS ACROSS MULTIPLE SCIENTIFIC DISCIPLINES THE AIM OF THIS HANDBOOK IS TO FAMILIARIZE BEGINNERS AS WELL AS EXPERTS WITH SOME OF THE RECENT TECHNIQUES IN THIS FIELD THE HANDBOOK IS DIVIDED IN TWO SECTIONS THEORY AND APPLICATIONS COVERING MACHINE LEARNING DATA ANALYTICS BIOMETRICS DOCUMENT RECOGNITION AND SECURITY

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