EPUB FREE ADVANCES IN APPLIED AND COMPUTATIONAL TOPOLOGY PROCEEDINGS OF SYMPOSIA IN APPLIED MATHEMATICS (READ ONLY)

WHAT IS THE SHAPE OF DATA HOW DO WE DESCRIBE FLOWS CAN WE COUNT BY INTEGRATING HOW DO WE PLAN WITH UNCERTAINTY WHAT IS THE MOST COMPACT REPRESENTATION THESE QUESTIONS WHILE UNRELATED BECOME SIMILAR WHEN RECAST INTO A COMPUTATIONAL SETTING OUR INPUT IS A SET OF FINITE DISCRETE NOISY SAMPLES THAT DESCRIBES AN ABSTRACT SPACE OUR GOAL IS TO COMPUTE QUALITATIVE FEATURES OF THE UNKNOWN SPACE IT TURNS OUT THAT TOPOLOGY IS SUFFICIENTLY TOLERANT TO PROVIDE US WITH ROBUST TOOLS THIS VOLUME IS BASED ON LECTURES DELIVERED AT THE 2011 AMS SHORT COURSE ON COMPUTATIONAL TOPOLOGY HELD JANUARY 4 5 2011 IN NEW ORLEANS LOUISIANA THE AIM OF THE VOLUME IS TO PROVIDE A BROAD INTRODUCTION TO RECENT TECHNIQUES FROM APPLIED AND COMPUTATIONAL TOPOLOGY AFRA ZOMORODIAN FOCUSES ON TOPOLOGICAL DATA ANALYSIS VIA EFFICIENT CONSTRUCTION OF COMBINATORIAL STRUCTURES AND RECENT THEORIES OF PERSISTENCE MARIAN MROZEK ANALYZES ASYMPTOTIC BEHAVIOR OF DYNAMICAL SYSTEMS VIA EFFICIENT COMPUTATION OF CUBICAL HOMOLOGY JUSTIN CURRY ROBERT GHRIST AND MICHAEL ROBINSON PRESENT EULER CALCULUS AN INTEGRAL CALCULUS BASED ON THE EULER CHARACTERISTIC AND APPLY IT TO SENSOR AND NETWORK DATA AGGREGATION MICHAEL ERDMANN EXPLORES THE RELATIONSHIP OF TOPOLOGY PLANNING AND PROBABILITY WITH THE STRATEGY COMPLEX JEFF ERICKSON SURVEYS ALGORITHMS AND HARDNESS RESULTS FOR TOPOLOGICAL OPTIMIZATION PROBLEMS THIS SECOND VOLUME OF RESEARCH IN COMPUTATIONAL TOPOLOGY IS A CELEBRATION AND PROMOTION OF RESEARCH BY WOMEN IN APPLIED AND COMPUTATIONAL TOPOLOGY CONTAINING THE PROCEEDINGS OF THE SECOND WORKSHOP FOR WOMEN IN COMPUTATIONAL TOPOLOGY WINCOMPTOP AS WELL AS PAPERS SOLICITED FROM THE BROADER WINCOMPTOP COMMUNITY THE MULTIDISCIPLINARY AND INTERNATIONAL WINCOMPTOP WORKSHOP PROVIDED AN EXCITING AND UNIQUE OPPORTUNITY FOR WOMEN IN DIVERSE LOCATIONS AND RESEARCH SPECIALIZATIONS TO INTERACT EXTENSIVELY AND COLLECTIVELY CONTRIBUTE TO NEW AND ACTIVE RESEARCH DIRECTIONS IN THE FIELD THE PRESTIGIOUS SENIOR RESEARCHERS THAT SIGNED ON TO HEAD PROJECTS AT THE WORKSHOP ARE GLOBAL LEADERS IN THE DISCIPLINE AND TWO OF THEM WERE AUTHORS ON SOME OF THE FIRST PAPERS IN THE FIELD SOME OF THE FEATURED TOPICS INCLUDE TOPOLOGICAL DATA ANALYSIS OF POWER LAW STRUCTURE IN NEURAL DATA A NERVE THEOREM FOR DIRECTIONAL GRAPH COVERS TOPOLOGICAL OR HOMOTOPICAL INVARIANTS FOR DIRECTED GRAPHS ENCODING CONNECTIONS AMONG A NETWORK OF NEURONS AND THE ISSUE OF APPROXIMATION OF OBJECTS BY DIGITAL GRIDS INCLUDING PRECISE RELATIONS BETWEEN THE PERSISTENT HOMOLOGY OF DUAL CUBICAL COMPLEXES THIS BOOK CONSTITUTES THE PROCEEDINGS OF THE 7TH INTERNATIONAL WORKSHOP ON COMPUTATIONAL TOPOLOGY IN IMAGE CONTEXT CTIC 2019 HELD IN MÁLAGA SPAIN IN JANUARY 2019 THE 14 PAPERS PRESENTED IN THIS VOLUME WERE CAREFULLY REVIEWED AND SELECTED FROM 21 SUBMISSIONS PAPERS DEAL WITH THEORETICAL ISSUES BUT MOST OF THEM PUT THE ATTENTION ON THE APPLICABILITY OF CONCEPTS AND ALGORITHMS THESE WERE DESIGNED TO DEAL WITH OBJECTS AND IMAGES BUT ALSO WITH THE SPEECH SIGNAL THE FINAL APPLICATION MUST BE FOR INSTANCE IN THE MEDICAL DOMAIN OR IN THE ROBOTICS ONE THIS BOOK CONSTITUTES THE PROCEEDINGS OF THE 4TH INTERNATIONAL WORKSHOP ON COMPUTATIONAL TOPOLOGY IN IMAGE CONTEXT CTIC 2012 HELD IN BERTINORO ITALY IN MAY 2012 THE 16 PAPERS PRESENTED IN THIS VOLUME WERE CAREFULLY REVIEWED AND SELECTED FOR INCLUSION IN THIS BOOK THEY FOCUS ON THE TOPOLOGY AND COMPUTATION IN IMAGE CONTEXT THE WORKSHOP IS DEVOTED TO COMPUTATIONAL METHODS USING TOPOLOGY FOR THE ANALYSIS AND COMPARISON OF IMAGES THE INVOLVED RESEARCH FIELDS COMPRISE COMPUTATIONAL TOPOLOGY AND GEOMETRY DISCRETE TOPOLOGY AND GEOMETRY GEOMETRICAL MODELING ALGEBRAIC TOPOLOGY FOR IMAGE APPLICATIONS AND ANY OTHER FIELD INVOLVING A GEOMETRIC TOPOLOGICAL APPROACH TO IMAGE PROCESSING THIS BOOK CONSTITUTES THE PROCEEDINGS OF THE 6TH INTERNATIONAL WORKSHOP ON COMPUTATIONAL TOPOLOGY IN IMAGE CONTEXT CTIC 2016 HELD IN MARSEILLE FRANCE IN JUNE 2016 THE 24 PAPERS PRESENTED IN THIS VOLUME WERE CAREFULLY REVIEWED AND SELECTED FROM 35 SUBMISSIONS ADDITIONALLY THIS VOLUME CONTAINS 2 INVITED PAPERS CTIC COVERS A WIDE RANGE OF TOPICS SUCH AS TOPOLOGICAL INVARIANTS AND THEIR COMPUTATION HOMOLOGY COHOMOLOGY LINKING NUMBER FUNDAMENTAL GROUPS ALGORITHM OPTIMIZATION IN DISCRETE GEOMETRY TRANSFER OF MATHEMATICAL TOOLS PARALLEL COMPUTATION IN MULTI DIMENSIONAL VOLUME CONTEXT HIERARCHICAL APPROACHES EXPERIMENTAL EVALUATION OF ALGORITHMS AND HEURISTICS COMBINATORIAL OR MULTI RESOLUTION MODELS DISCRETE OR COMPUTATIONAL TOPOLOGY GEOMETRIC MODELING GUIDED BY TOPOLOGICAL CONSTRAINTS COMPUTATIONAL TOPOLOGICAL DYNAMICS AND USE OF TOPOLOGICAL INFORMATION IN DISCRETE GEOMETRY APPLICATIONS BASED ON THE FIRST WORKSHOP FOR WOMEN IN COMPUTATIONAL TOPOLOGY THAT TOOK PLACE IN 2016 THIS VOLUME ASSEMBLES NEW RESEARCH AND APPLICATIONS IN COMPUTATIONAL TOPOLOGY FEATURED ARTICLES RANGE OVER THE BREADTH OF THE DISCIPLINE INCLUDING TOPICS SUCH AS SURFACE RECONSTRUCTION TOPOLOGICAL DATA ANALYSIS PERSISTENT HOMOLOGY ALGORITHMS AND SURFACE EMBEDDED GRAPHS APPLICATIONS IN GRAPHICS MEDICAL IMAGING AND GIS ARE DISCUSSED THROUGHOUT THE BOOK FOUR OF THE PAPERS IN THIS VOLUME ARE THE PRODUCT OF WORKING GROUPS THAT WERE ESTABLISHED AND DEVELOPED DURING THE WORKSHOP ADDITIONAL PAPERS WERE ALSO SOLICITED FROM THE BROADER WOMEN IN COMPUTATIONAL TOPOLOGY NETWORK THE VOLUME IS ACCESSIBLE TO A BROAD RANGE OF RESEARCHERS BOTH WITHIN THE FIELD OF COMPUTATIONAL TOPOLOGY AND IN RELATED DISCIPLINES SUCH AS STATISTICS COMPUTATIONAL BIOLOGY AND MACHINE LEARNING SINGULARITY THEORY APPEARS IN NUMEROUS BRANCHES OF MATHEMATICS AS WELL AS IN MANY EMERGING AREAS SUCH AS ROBOTICS CONTROL THEORY IMAGING AND VARIOUS EVOLVING AREAS IN PHYSICS THE PURPOSE OF THIS PROCEEDINGS VOLUME IS TO COVER RECENT DEVELOPMENTS IN SINGULARITY THEORY AND TO INTRODUCE YOUNG RESEARCHERS FROM DEVELOPING COUNTRIES TO SINGULARITIES IN GEOMETRY AND TOPOLOGY THE CONTRIBUTIONS DISCUSS SINGULARITIES IN BOTH COMPLEX AND REAL GEOMETRY AS SUCH THEY PROVIDE A NATURAL CONTINUATION OF THE PREVIOUS SCHOOL ON SINGULARITIES HELD AT ICTP 1991 WHICH IS RECOGNIZED AS HAVING HAD A MAJOR INFLUENCE IN THE FIELD THE PAPERS WERE ELICITED PRIMARILY FROM MATHEMATICS FOR INDUSTRY CHALLENGES AND FRONTIERS A CONFERENCE SPONSORED BY SIAM IN OCTOBER 2003 THIS VOLUME IS A COLLECTION OF REFEREED EXPOSITORY AND RESEARCH ARTICLES IN DISCRETE AND COMPUTATIONAL GEOMETRY WRITTEN BY LEADERS IN THE FIELD ARTICLES ARE BASED ON INVITED TALKS PRESENTED AT THE AMS IMS SIAM SUMMER RESEARCH CONFERENCE DISCRETE AND COMPUTATIONAL GEOMETRY TEN YEARS LATER HELD IN 1996 AT MT HOLYOKE COLLEGE SO HADLEY MA TOPICS ADDRESSED RANGE FROM TILINGS POLYHEDRA AND ARRANGEMENTS TO COMPUTATIONAL TOPOLOGY AND VISIBILITY PROBLEMS INCLUDED ARE PAPERS ON THE INTERACTION BETWEEN REAL ALGEBRAIC GEOMETRY AND DISCRETE AND COMPUTATIONAL GEOMETRY AS WELL AS ON LINEAR PROGRAMMING AND GEOMETRIC DISCREPANCY THEORY THIS COLLECTION OF PEER REVIEWED WORKSHOP PAPERS PROVIDES COMPREHENSIVE COVERAGE OF CUTTING EDGE RESEARCH INTO TOPOLOGICAL APPROACHES TO DATA ANALYSIS AND APPLICATIONS OF

IT ENCOMPASSES THE FULL RANGE OF NEW ALGORITHMS AND INSIGHTS INCLUDING FAST HOMOLOGY COMPUTATION COMPARATIVE ANALYSIS OF SIMPLIFICATION TECHNIQUES AND KEY APPLICATIONS IN MATERIALS AND MEDICAL SCIENCE THE BOOK ALSO ADDRESSES CORE RESEARCH CHALLENGES SUCH AS THE REPRESENTATION OF LARGE AND COMPLEX DATASETS AND INTEGRATING NUMERICAL METHODS WITH ROBUST COMBINATORIAL ALGORITHMS IN KEEPING WITH THE FOCUS OF THE TOPOINVIS 2017 WORKSHOP THE CONTRIBUTIONS REFLECT THE LATEST ADVANCES IN FINDING EXPERIMENTAL SOLUTIONS TO OPEN PROBLEMS IN THE SECTOR THEY PROVIDE AN ESSENTIAL SNAPSHOT OF STATE OF THE ART RESEARCH HELPING RESEARCHERS TO KEEP ABREAST OF THE LATEST DEVELOPMENTS AND PROVIDING A BASIS FOR FUTURE WORK GATHERING PAPERS BY SOME OF THE WORLD S LEADING EXPERTS ON TOPOLOGICAL TECHNIQUES THE BOOK REPRESENTS A VALUABLE CONTRIBUTION TO A FIELD OF GROWING IMPORTANCE WITH APPLICATIONS IN DISCIPLINES RANGING FROM ENGINEERING TO MEDICINE THE PROCEEDINGS OF AN INTERNATIONAL TOPOLOGY CONFERENCE THIS BOOK COVRS VARIOUS ASPECTS OF GENERAL ALGEBRAIC AND LOW DIMENSIONAL TOPOLOGY THIS INTERDISCIPLINARY BOOK COVERS A WIDE RANGE OF SUBJECTS FROM PURE MATHEMATICS KNOTS BRAIDS HOMOTOPY THEORY NUMBER THEORY TO MORE APPLIED MATHEMATICS CRYPTOGRAPHY ALGEBRAIC SPECIFICATION OF ALGORITHMS DYNAMICAL SYSTEMS AND CONCRETE APPLICATIONS MODELING OF POLYMERS AND IONIC LIQUIDS VIDEO MUSIC AND MEDICAL IMAGING THE MAIN MATHEMATICAL FOCUS THROUGHOUT THE BOOK IS ON ALGEBRAIC MODELING WITH PARTICULAR EMPHASIS ON BRAID GROUPS THE RESEARCH METHODS INCLUDE ALGEBRAIC MODELING USING TOPOLOGICAL STRUCTURES SUCH AS KNOTS 3 MANIFOLDS CLASSICAL HOMOTOPY GROUPS AND BRAID GROUPS THE APPLICATIONS ADDRESS THE SIMULATION OF POLYMER CHAINS AND IONIC LIQUIDS AS WELL AS THE MODELING OF NATURAL PHENOMENA VIA TOPOLOGICAL SURGERY THE TREATMENT OF COMPUTATIONAL STRUCTURES INCLUDING FINITE FIELDS AND CRYPTOGRAPHY FOCUSES ON THE DEVELOPMENT OF NOVEL TECHNIQUES THESE TECHNIQUES CAN BE APPLIED TO THE DESIGN OF ALGEBRAIC SPECIFICATIONS FOR SYSTEMS MODELING AND VERIFICATION THIS BOOK IS THE OUTCOME OF A WORKSHOP IN CONNECTION WITH THE RESEARCH PROJECT THALES ON ALGEBRAIC MODELING OF TOPOLOGICAL AND COMPUTATIONAL STRUCTURES AND APPLICATIONS HELD AT THE NATIONAL TECHNICAL UNIVERSITY OF ATHENS GREECE IN JULY 2015 THE READER WILL BENEFIT FROM THE INNOVATIVE APPROACHES TO TACKLING DIFFICULT QUESTIONS IN TOPOLOGY APPLICATIONS AND INTERRELATED RESEARCH AREAS WHICH LARGELY EMPLOY ALGEBRAIC TOOLS THIS BOOK IS A RESULT OF A WORKSHOP THE 8TH OF THE SUCCESSFUL TOPOINVIS WORKSHOP SERIES HELD IN 2019 IN NYKÖPING SWEDEN THE WORKSHOP REGULARLY GATHERS SOME OF THE WORLD S LEADING EXPERTS IN THIS FIELD THEREBY IT PROVIDES A FORUM FOR DISCUSSIONS ON THE LATEST ADVANCES IN THE FIELD WITH A FOCUS ON FINDING PRACTICAL SOLUTIONS TO OPEN PROBLEMS IN TOPOLOGICAL DATA ANALYSIS FOR VISUALIZATION THE CONTRIBUTIONS PROVIDE INTRODUCTORY AND NOVEL RESEARCH ARTICLES INCLUDING NEW CONCEPTS FOR THE ANALYSIS OF MULTIVARIATE AND TIME DEPENDENT DATA ROBUST COMPUTATIONAL APPROACHES FOR THE EXTRACTION AND APPROXIMATIONS OF TOPOLOGICAL STRUCTURES WITH THEORETICAL GUARANTEES AND APPLICATIONS OF TOPOLOGICAL SCALAR AND VECTOR FIELD ANALYSIS FOR VISUALIZATION THE APPLICATIONS SPAN A WIDE RANGE OF SCIENTIFIC AREAS COMPRISING CLIMATE SCIENCE MATERIAL SCIENCES FLUID DYNAMICS AND ASTRONOMY IN ADDITION COMMUNITY EFFORTS WITH RESPECT TO JOINT SOFTWARE DEVELOPMENT ARE REPORTED AND DISCUSSED THIS BOOK GATHERS THE PROCEEDINGS OF THE 2018 ABEL SYMPOSIUM WHICH WAS HELD IN GEIRANGER NORWAY ON JUNE 4 8 2018 THE SYMPOSIUM OFFERED AN OVERVIEW OF THE EMERGING FIELD OF TOPOLOGICAL DATA ANALYSIS THIS VOLUME PRESENTS PAPERS ON VARIOUS RESEARCH DIRECTIONS NOTABLY INCLUDING APPLICATIONS IN NEUROSCIENCE MATERIALS SCIENCE CANCER BIOLOGY AND IMMUNE RESPONSE PROVIDING AN ESSENTIAL SNAPSHOT OF THE STATUS QUO IT REPRESENTS A VALUABLE ASSET FOR PRACTITIONERS AND THOSE CONSIDERING ENTERING THE FIELD COMPUTATIONAL TOPOLOGYBY JOHN HARER COMBINING CONCEPTS FROM TOPOLOGY AND ALGORITHMS THIS BOOK DELIVERS WHAT ITS TITLE PROMISES AN INTRODUCTION TO THE FIELD OF COMPUTATIONAL TOPOLOGY STARTING WITH MOTIVATING PROBLEMS IN BOTH MATHEMATICS AND COMPUTER SCIENCE AND BUILDING UP FROM CLASSIC TOPICS IN GEOMETRIC AND ALGEBRAIC TOPOLOGY THE THIRD PART OF THE TEXT ADVANCES TO PERSISTENT HOMOLOGY THIS POINT OF VIEW IS CRITICALLY IMPORTANT IN TURNING A MOSTLY THEORETICAL FIELD OF MATHEMATICS INTO ONE THAT IS RELEVANT TO A MULTITUDE OF DISCIPLINES IN THE SCIENCES AND ENGINEERING THE MAIN APPROACH IS THE DISCOVERY OF TOPOLOGY THROUGH ALGORITHMS THE BOOK IS IDEAL FOR TEACHING A GRADUATE OR ADVANCED UNDERGRADUATE COURSE IN COMPUTATIONAL TOPOLOGY AS IT DEVELOPS ALL THE BACKGROUND OF BOTH THE MATHEMATICAL AND ALGORITHMIC ASPECTS OF THE SUBJECT FROM FIRST PRINCIPLES THUS THE TEXT COULD SERVE EQUALLY WELL IN A COURSE TAUGHT IN A MATHEMATICS DEPARTMENT OR COMPUTER SCIENCE DEPARTMENT THIS BOOK DISCUSSES THE COMPUTATIONAL GEOMETRY TOPOLOGY AND PHYSICS OF DIGITAL IMAGES AND VIDEO FRAME SEQUENCES THIS TRIO OF COMPUTATIONAL APPROACHES ENCOMPASSES THE STUDY OF SHAPE COMPLEXES OPTICAL VORTEX NERVES AND PROXIMITIES EMBEDDED IN TRIANGULATED VIDEO FRAMES AND SINGLE IMAGES WHILE COMPUTATIONAL GEOMETRY FOCUSES ON THE GEOMETRIC STRUCTURES THAT INFUSE TRIANGULATED VISUAL SCENES THE BOOK FIRST ADDRESSES THE TOPOLOGY OF CELLULAR COMPLEXES TO PROVIDE A BASIS FOR AN INTRODUCTORY STUDY OF THE COMPUTATIONAL TOPOLOGY OF VISUAL SCENES EXPLORING THE FABRIC SHAPES AND STRUCTURES TYPICALLY FOUND IN VISUAL SCENES THE BOOK THEN EXAMINES THE INHERENT GEOMETRY AND TOPOLOGY OF VISUAL SCENES AND THE FINE STRUCTURE OF LIGHT AND LIGHT CAUSTICS OF VISUAL SCENES WHICH BRING INTO PLAY CATASTROPHE THEORY AND THE APPEARANCE OF LIGHT CAUSTIC FOLDS AND CUSPS FOLLOWING ON FROM THIS THE BOOK INTRODUCES OPTICAL VORTEX NERVES IN TRIANGULATED DIGITAL IMAGES IN THIS CONTEXT COMPUTATIONAL PHYSICS IS SYNONYMOUS WITH THE STUDY OF THE FINE STRUCTURE OF LIGHT CHOREOGRAPHED IN VIDEO FRAMES THIS CHOREOGRAPHY APPEARS AS A SEQUENCE OF SNAPSHOTS OF LIGHT REFLECTED AND REFRACTED FROM SURFACE SHAPES PROVIDING A SOLID FOUNDATION FOR DETECTING ANALYZING AND CLASSIFYING VISUAL SCENE SHAPES THE THEORY AND PRACTICE OF COMPUTATION IN ALGEBRAIC GEOMETRY AND RELATED DOMAINS FROM A MATHEMATICAL POINT OF VIEW HAS GENERATED AN INCREASING INTEREST BOTH FOR ITS RICH THEORETICAL POSSIBILITIES AND ITS USEFULNESS IN APPLICATIONS IN SCIENCE AND ENGINEERING IN FACT IT IS ONE OF THE MASTER KEYS FOR FUTURE SIGNIFICANT IMPROVEMENT OF THE COMPUTER ALGEBRA SYSTEMS E G REDUCE MACSYMA MAPLE MATHEMATICA AXIOM MACAULAY ETC THAT HAVE BECOME SUCH USEFUL TOOLS FOR MANY SCIENTISTS IN A VARIETY OF DISCIPLINES THE MAJOR THEMES COVERED IN THIS VOLUME ARISING FROM PAPERS P SENTED AT THE CONFERENCE MEGA 92 WERE EFFECTIVE METHODS AND COMPLEXITY ISSUES IN COMMUTATIVE ALGEBRA PROJECTIVE GEOMETRY REAL GEOMETRY AND ALGEBRAIC NUMBER THEORY ALGEBRA GEOMETRIC METHODS IN ALGEBRAIC COMPUTING AND APPLICA TIONS MEGA 92 WAS THE SECOND OF A NEW SERIES OF EUROPEAN CONFERENCES ON THE GENERAL THEME OF EFFECTIVE METHODS IN ALGEBRAIC GEOMETRY IT WAS HELD IN NICE FRANCE ON APRIL 21 25 1992 AND BUILT ON THE THEMES PRESENTED AT MEGA 90 LIVOMO ITALY APRIL 17 21 1990 THE NEXT CONFERENCE MEGA 94 WILL BE HELD IN SANTANDER SPAIN IN THE SPRING OF 1994 THE ORGANIZING COMMITTEE THAT INITIATIOD AND SUPERVISES THIS BI ENNIEL CONFERENCE CONSISTS OF A CONTE TORINO J H DAVENPORT BATH A GALLIGO NICE D YU GRIGORIEV PETERSBURG J HEINTZ BUENOS AIRES W LASSNER LEIPZIG D LAZARD PARIS H M MOLLER HAGEN T MORA GENOVA M POHST DUSSELDORT T RECIO SANTANDER J J TOPOLOGY BASED METHODS ARE OF INCREASING IMPORTANCE IN THE ANALYSIS AND VISUALIZATION OF

DATASETS FROM A WIDE VARIETY OF SCIENTIFIC DOMAINS SUCH AS BIOLOGY PHYSICS ENGINEERING AND MEDICINE CURRENT CHALLENGES OF TOPOLOGY BASED TECHNIQUES INCLUDE THE MANAGEMENT OF TIME DEPENDENT DATA THE REPRESENTATION OF LARGE AND COMPLEX DATASETS THE CHARACTERIZATION OF NOISE AND UNCERTAINTY THE EFFECTIVE INTEGRATION OF NUMERICAL METHODS WITH ROBUST COMBINATORIAL ALGORITHMS ETC THE EDITORS HAVE BROUGHT TOGETHER THE MOST PROMINENT AND BEST RECOGNIZED RESEARCHERS IN THE FIELD OF TOPOLOGY BASED DATA ANALYSIS AND VISUALIZATION FOR A JOINT DISCUSSION AND SCIENTIFIC EXCHANGE OF THE LATEST RESULTS IN THE FIELD THIS BOOK CONTAINS THE BEST 20 PEER REVIEWED PAPERS RESULTING FROM THE DISCUSSIONS AND PRESENTATIONS AT THE THIRD WORKSHOP ON TOPOLOGICAL METHODS IN DATA ANALYSIS AND VISUALIZATION HELD 2009 IN SNOWBIRD UTAH US THE 2009 TOPOINVIS WORKSHOP FOLLOWS THE TWO SUCCESSFUL WORKSHOPS IN 2005 SLOVAKIA AND 2007 GERMANY THE INTERPLAY BETWEEN ALGEBRA AND GEOMETRY IS A BEAUTIFUL AND FUN AREA OF MATHEMATICAL INVESTIGATION ADVANCES IN COMPUTING AND ALGORITHMS MAKE IT POSSIBLE TO TACKLE MANY CLASSICAL PROBLEMS IN A DOWN TO EARTH AND CONCRETE FASHION THIS OPENS WONDERFUL NEW VISTAS AND ALLOWS US TO POSE STUDY AND SOLVE PROBLEMS THAT WERE PREVIOUSLY OUT OF REACH SUITABLE FOR GRADUATE STUDENTS THE OBJECTIVE OF THIS 2003 BOOK IS TO BRING ADVANCED ALGEBRA TO LIFE WITH LOTS OF EXAMPLES THE FIRST CHAPTERS PROVIDE AN INTRODUCTION TO COMMUTATIVE ALGEBRA AND CONNECTIONS TO GEOMETRY THE REST OF THE BOOK FOCUSES ON THREE ACTIVE AREAS OF CONTEMPORARY ALGEBRA HOMOLOGICAL ALGEBRA THE SNAKE LEMMA LONG EXACT SEQUENCE INHOMOLOGY FUNCTORS AND DERIVED FUNCTORS TOR AND EXT AND DOUBLE COMPLEXES ALGEBRAIC COMBINATORICS AND ALGEBRAIC TOPOLOGY SIMPLICIAL COMPLEXES AND SIMPLICIAL HOMOLOGY STANLEY REISNER RINGS UPPER BOUND THEOREM AND POLYTOPES AND ALGEBRAIC GEOMETRY POINTS AND CURVES IN PROJECTIVE SPACE RIEMANN ROCH CECH COHOMOLOGY REGULARITY THIS BOOK CONTAINS A COLLECTION OF ARTICLES CORRESPONDING TO SOME OF THE TALKS DELIVERED AT THE FOUNDATIONS OF COMPUTATIONAL MATHEMATICS CONFERENCE HELD AT IMPA IN RIO DE JANEIRO IN JANUARY 1997 SOME OFTHE OTHERS ARE PUBLISHED IN THE DECEMBER 1996 ISSUE OF THE JOURNAL OF COMPLEXITY BOTH OF THESE PUBLICATIONS WERE AVAILABLE AND DISTRIBUTED AT THE MEETING EVEN IN THIS ASPECT WE HOPE TO HAVE ACHIEVED A SYNTHESIS OF THE MATHEMATICS AND COMPUTER SCIENCE CULTURES AS WELL AS OF THE DISCIPLINES THE REACTION TO THE PARK CITY MEETING ON MATHEMATICS OF NUMERICAL ANALY SIS REAL NUMBER ALGORITHMS WHICH WAS CHAIRED BY STEVE SMALE AND HAD AROUND 275 PARTICIPANTS WAS VERY ENTHUSIASTIC AT THE SUGGESTION OF NARENDRA KARMAR MAR A LUNCH TIME MEETING OF FELIPE CUCKER ARIEH ISERLES NARENDRA KARMARKAR JIM RENEGAR MIKE SHUB AND STEVE SMALE DECIDED TO TRY TO HOLD A PERIODIC MEETING ENTITLED FOUNDATIONS OF COMPUTATIONAL MATHEMATICS AND TO FORM AN ORGANIZATION WITH THE SAME NAME WHOSE PRIMARY PURPOSE WILL BE TO HOLD THE MEETING THIS IS THEN THE FIRST EDITION OF FOCM AS SUCH IT HAS BEEN ORGANIZED AROUND A SMALL COLLECTION OF WORKSHOPS NAMELY SYSTEMS OF ALGEBRAIC EQUATIONS AND COMPUTATIONAL ALGEBRAIC GEOMETRY HOMOTOPY METHODS AND REAL MACHINES INFORMATION BASED COMPLEXITY NUMERICAL LINEAR ALGEBRA APPROXIMATION AND PDES OPTIMIZATION DIFFERENTIAL EQUATIONS AND DYNAMICAL SYSTEMS RELATIONS TO COMPUTER SCIENCE VISION AND RELATED COMPUTATIONAL TOOLS THERE WERE ALSO TWELVE PLENARY SPEAKERS IN THIS CHAPTER WE INTRODUCE SOME OF THE VERY BASICS THAT ARE USED THROUGHOUT THE BOOK FIRST WE GIVE THE DEFINITION OF A TOPOLOGICAL SPACE AND RELATED NOTIONS OF OPEN AND CLOSED SETS COVERS SUBSPACE TOPOLOGY TO CONNECT TOPOLOGY AND GEOMETRY WE DEVOTE A SECTION ON METRIC SPACES MAPS SUCH AS HOMEOMORPHISM AND HOMOTOPY EQUIVALENCE THAT PLAY A SIGNIFICANT ROLE TO RELATE TOPOLOGICAL SPACES CERTAIN CATEGORIES OF TOPOLOGICAL SPACES BECOME IMPORTANT FOR THEIR WIDE PRESENCE IN APPLICATIONS MANIFOLDS ARE ONE SUCH CATEGORY WHICH WE INTRODUCE IN THIS CHAPTER FUNCTIONS ON THEM SATISFYING CERTAIN CONDITIONS ARE PRESENTED AS MORSE FUNCTIONS THE CRITICAL POINTS OF SUCH FUNCTIONS RELATE TO THE TOPOLOGY OF THE MANIFOLD THEY ARE DEFINED ON WE INTRODUCE THESE CONCEPTS IN THE SMOOTH SETTING IN THIS CHAPTER AND LATER ADAPT THEM FOR THE PIECEWISE LINEAR DOMAINS FREQUENTLY USED FOR FINITE COMPUTATIONS FINALLY A SECTION ON NOTES POINTS OUT TO THE HISTORY AND RELEVANT LITERATURE FOR THE CONCEPTS DELINEATED IN THE CHAPTER IT ENDS WITH A SERIES OF EXERCISES THAT MAY BE USED FOR TEACHING A CLASS ON THE SUBJECT BOTH AT GRADUATE AND UNDERGRADUATE LEVEL NUMEROUS WELL PRESENTED AND IMPORTANT PAPERS FROM THE CONFERENCE ARE GATHERED IN THE PROCEEDINGS FOR THE PURPOSE OF POINTING DIRECTIONS FOR USEFUL FUTURE RESEARCH IN DIVERSE AREAS OF MATHEMATICS INCLUDING ALGEBRAIC GEOMETRY ANALYSIS COMMUTATIVE ALGEBRA COMPLEX ANALYSIS DISCRETE MATHEMATICS DYNAMICAL SYSTEMS NUMBER THEORY AND TOPOLOGY SEVERAL PAPERS ON COMPUTATIONAL AND APPLIED MATHEMATICS SUCH AS WAVELET ANALYSIS QUANTUM MECHANICS PIECEWISE LINEAR MODELING COSMOLOGICAL MODELS OF SUPER SYMMETRY FLUID DYNAMICS INTERPOLATION THEORY OPTIMIZATION ERGODIC THEORY AND GAMES THEORY ARE ALSO PRESENTED THE THREE VOLUME SET LNCS 2667 LNCS 2668 AND LNCS 2669 CONSTITUTES THE REFEREED PROCEEDINGS OF THE INTERNATIONAL CONFERENCE ON COMPUTATIONAL SCIENCE AND ITS APPLICATIONS ICCSA 2003 HELD IN MONTREAL CANADA IN MAY 2003 THE THREE VOLUMES PRESENT MORE THAN 300 PAPERS AND SPAN THE WHOLE RANGE OF COMPUTATIONAL SCIENCE FROM FOUNDATIONAL ISSUES IN COMPUTER SCIENCE AND MATHEMATICS TO ADVANCED APPLICATIONS IN VIRTUALLY ALL SCIENCES MAKING USE OF COMPUTATIONAL TECHNIQUES THE PROCEEDINGS GIVE A UNIQUE ACCOUNT OF RECENT RESULTS IN COMPUTATIONAL SCIENCE THIS INVALUABLE BOOK CONTAINS 19 PAPERS SELECTED FROM THOSE SUBMITTED TO A CONFERENCE HELD IN HONG KONG IN JULY 2000 TO CELEBRATE THE 70th BIRTHDAY OF PROFESSOR STEVE SMALE IT MAY BE REGARDED AS A CONTINUATION OF THE PROCEEDINGS OF SMALEFEST 1990 FROM TOPOLOGY TO COMPUTATION HELD IN BERKELEY USA 10 YEARS BEFORE BUT WITH THE FOCUS ON THE AREA IN WHICH SMALE WORKED MORE INTENSIVELY DURING THE 90 S NAMELY THE FOUNDATIONS OF COMPUTATIONAL MATHEMATICS ANALYSIS AND COMPUTATION OF FIXED POINTS CONTAINS THE PROCEEDINGS OF A SYMPOSIUM ON ANALYSIS AND COMPUTATION OF FIXED POINTS HELD AT THE UNIVERSITY OF WISCONSIN MADISON ON MAY 7 8 1979 THE PAPERS FOCUS ON THE ANALYSIS AND COMPUTATION OF FIXED POINTS AND COVER TOPICS RANGING FROM PATHS GENERATED BY FIXED POINT ALGORITHMS TO STRONGLY STABLE STATIONARY SOLUTIONS IN NONLINEAR PROGRAMS A SIMPLE RELIABLE NUMERICAL ALGORITHM FOR FOLLOWING HOMOTOPY PATHS IS ALSO PRESENTED COMPRISED OF NINE CHAPTERS THIS BOOK BEGINS BY DESCRIBING THE TECHNIQUES OF NUMERICAL LINEAR ALGEBRA THAT POSSESS ATTRACTIVE STABILITY PROPERTIES AND EXPLOIT SPARSITY AND THEIR APPLICATION TO THE LINEAR SYSTEMS THAT ARISE IN ALGORITHMS THAT SOLVE EQUATIONS BY CONSTRUCTING PIECEWISE LINEAR HOMOTOPIES THE READER IS THEN INTRODUCED TO TWO TRIANGULATIONS FOR HOMOTOPY FIXED POINT ALGORITHMS WITH AN ARBITRARY GRID REFINEMENT FOLLOWED BY A DISCUSSION ON SOME GENERIC PROPERTIES OF PATHS GENERATED BY FIXED POINT ALGORITHMS SUBSEQUENT CHAPTERS DEAL WITH TOPOLOGICAL PERTURBATIONS IN THE NUMERICAL STUDY OF NONLINEAR EIGENVALUE AND BIFURCATION PROBLEMS GENERAL EQUILIBRIUM ANALYSIS OF TAXATION POLICY AND SOLVING URBAN GENERAL EQUILIBRIUM MODELS BY FIXED POINT METHODS THE BOOK CONCLUDES WITH AN EVALUATION OF ECONOMIC EQUILIBRIUM UNDER DEFORMATION OF THE ECONOMY THIS MONOGRAPH SHOULD BE OF INTEREST TO STUDENTS AND SPECIALISTS IN THE FIELD OF MATHEMATICS THIS BOOK PROVIDES AN ACCESSIBLE YET RIGOROUS INTRODUCTION TO TOPOLOGY AND

HOMOLOGY FOCUSED ON THE SIMPLICIAL SPACE IT PRESENTS A COMPACT PIPELINE FROM THE FOUNDATIONS OF TOPOLOGY TO BIOMEDICAL APPLICATIONS IT WILL BE OF INTEREST TO MEDICAL PHYSICISTS COMPUTER SCIENTISTS AND ENGINEERS AS WELL AS UNDERGRADUATE AND GRADUATE STUDENTS INTERESTED IN THIS TOPIC FEATURES PRESENTS A PRACTICAL GUIDE TO ALGEBRAIC TOPOLOGY AS WELL AS PERSISTENCE HOMOLOGY CONTAINS APPLICATION EXAMPLES IN THE FIELD OF BIOMEDICINE INCLUDING THE ANALYSIS OF HISTOLOGICAL IMAGES AND POINT CLOUD DATA TOPOLOGICAL AND GEOMETRIC MODELING IMPLICIT SURFACES ANALYZING AND TRANSFORMING SHAPES VOLUME MODELING AND APPLICATIONS ARE AMONG THE CONCERNS OF THE 32 PAPERS SELECTED FOR PUBLICATION THE SEVEN INVITED PAPERS DISCUSS VALID VERSUS INVALID COMPUTATIONAL SHAPE MODELING COMPUTATIONAL TOPOLOGY FOR THIS VOLUME CONTAINS THE PROCEEDINGS OF THE 16TH CAROLINA DYNAMICS SYMPOSIUM HELD FROM APRIL 13 15 2018 AT AGNES SCOTT COLLEGE DECATUR GEORGIA THE PAPERS COVER VARIOUS TOPICS IN DYNAMICS AND RANDOMNESS INCLUDING COMPLEX DYNAMICS ERGODIC THEORY TOPOLOGICAL DYNAMICS CELESTIAL MECHANICS SYMBOLIC DYNAMICS COMPUTATIONAL TOPOLOGY RANDOM PROCESSES AND REGULAR LANGUAGES THE INTENT IS TO PROVIDE A GLIMPSE OF THE RICHNESS OF THE FIELD AND OF THE COMMON THREADS THAT TIE THE DIFFERENT SPECIALTIES TOGETHER THIS VOLUME CONTAINS THE PROCEEDINGS OF THE VIRTUAL WORKSHOP ON COMPUTATIONAL ASPECTS OF DISCRETE SUBGROUPS OF LIE GROUPS HELD FROM JUNE 14 TO JUNE 18 2021 AND HOSTED BY THE INSTITUTE FOR COMPUTATIONAL AND EXPERIMENTAL RESEARCH IN MATHEMATICS ICERM PROVIDENCE RHODE ISLAND THE MAJOR THEME DEALS WITH A NOVEL DOMAIN OF COMPUTATIONAL ALGEBRA THE DESIGN IMPLEMENTATION AND APPLICATION OF ALGORITHMS BASED ON MATRIX REPRESENTATION OF GROUPS AND THEIR GEOMETRIC PROPERTIES IT IS CENTERED ON COMPUTING WITH DISCRETE SUBGROUPS OF LIE GROUPS WHICH IMPACTS MANY DIFFERENT AREAS OF MATHEMATICS SUCH AS ALGEBRA GEOMETRY TOPOLOGY AND NUMBER THEORY THE WORKSHOP AIMED TO SYNERGIZE INDEPENDENT STRANDS IN THE AREA OF COMPUTING WITH DISCRETE SUBGROUPS OF LIE GROUPS TO FACILITATE SOLUTION OF THEORETICAL PROBLEMS BY MEANS OF RECENT ADVANCES IN COMPUTATIONAL ALGEBRA THIS BOOK PROVIDES FORMAL AND INFORMAL DEFINITIONS AND TAXONOMIES FOR SELF AWARE COMPUTING SYSTEMS AND EXPLAINS HOW SELF AWARE COMPUTING RELATES TO MANY EXISTING SUBFIELDS OF COMPUTER SCIENCE ESPECIALLY SOFTWARE ENGINEERING IT DESCRIBES ARCHITECTURES AND ALGORITHMS FOR SELF AWARE SYSTEMS AS WELL AS THE BENEFITS AND PITFALLS OF SELF AWARENESS AND REVIEWS MUCH OF THE LATEST RELEVANT RESEARCH ACROSS A WIDE ARRAY OF DISCIPLINES INCLUDING OPEN RESEARCH CHALLENGES THE CHAPTERS OF THIS BOOK ARE ORGANIZED INTO FIVE PARTS INTRODUCTION SYSTEM ARCHITECTURES METHODS AND ALGORITHMS APPLICATIONS AND CASE STUDIES AND OUTLOOK PART I OFFERS AN INTRODUCTION THAT DEFINES SELF AWARE COMPUTING SYSTEMS FROM MULTIPLE PERSPECTIVES AND ESTABLISHES A FORMAL DEFINITION A TAXONOMY AND A SET OF REFERENCE SCENARIOS THAT HELP TO UNIFY THE REMAINING CHAPTERS NEXT PART II EXPLORES ARCHITECTURES FOR SELF AWARE COMPUTING SYSTEMS SUCH AS GENERIC CONCEPTS AND NOTATIONS THAT ALLOW A WIDE RANGE OF SELF AWARE SYSTEM ARCHITECTURES TO BE DESCRIBED AND COMPARED WITH BOTH ISOLATED AND INTERACTING SYSTEMS IT ALSO REVIEWS THE CURRENT STATE OF REFERENCE ARCHITECTURES ARCHITECTURAL FRAMEWORKS AND LANGUAGES FOR SELF AWARE SYSTEMS PART III FOCUSES ON METHODS AND ALGORITHMS FOR SELF AWARE COMPUTING SYSTEMS BY ADDRESSING ISSUES PERTAINING TO SYSTEM DESIGN LIKE MODELING SYNTHESIS AND VERIFICATION IT ALSO EXAMINES TOPICS SUCH AS ADAPTATION BENCHMARKS AND METRICS PART IV THEN PRESENTS APPLICATIONS AND CASE STUDIES IN VARIOUS DOMAINS INCLUDING CLOUD COMPUTING DATA CENTERS CYBER PHYSICAL SYSTEMS AND THE DEGREE TO WHICH SELF AWARE COMPUTING APPROACHES HAVE BEEN ADOPTED WITHIN THOSE DOMAINS LASTLY PART V SURVEYS OPEN CHALLENGES AND FUTURE RESEARCH DIRECTIONS FOR SELF AWARE COMPUTING SYSTEMS IT CAN BE USED AS A HANDBOOK FOR PROFESSIONALS AND RESEARCHERS WORKING IN AREAS RELATED TO SELF AWARE COMPUTING AND CAN ALSO SERVE AS AN ADVANCED TEXTBOOK FOR LECTURERS AND POSTGRADUATE STUDENTS STUDYING SUBJECTS LIKE ADVANCED SOFTWARE ENGINEERING AUTONOMIC COMPUTING SELF ADAPTIVE SYSTEMS AND DATA CENTER RESOURCE MANAGEMENT EACH CHAPTER IS LARGELY SELF CONTAINED AND OFFERS PLENTY OF REFERENCES FOR ANYONE WISHING TO PURSUE THE TOPIC MORE DEEPLY

Advances in Applied and Computational Topology 2012-07-05

WHAT IS THE SHAPE OF DATA HOW DO WE DESCRIBE FLOWS CAN WE COUNT BY INTEGRATING HOW DO WE PLAN WITH UNCERTAINTY WHAT IS THE MOST COMPACT REPRESENTATION THESE QUESTIONS WHILE UNRELATED BECOME SIMILAR WHEN RECAST INTO A COMPUTATIONAL SETTING OUR INPUT IS A SET OF FINITE DISCRETE NOISY SAMPLES THAT DESCRIBES AN ABSTRACT SPACE OUR GOAL IS TO COMPUTE QUALITATIVE FEATURES OF THE UNKNOWN SPACE IT TURNS OUT THAT TOPOLOGY IS SUFFICIENTLY TOLERANT TO PROVIDE US WITH ROBUST TOOLS THIS VOLUME IS BASED ON LECTURES DELIVERED AT THE 2011 AMS SHORT COURSE ON COMPUTATIONAL TOPOLOGY HELD JANUARY 4 5 2011 IN NEW ORLEANS LOUISIANA THE AIM OF THE VOLUME IS TO PROVIDE A BROAD INTRODUCTION TO RECENT TECHNIQUES FROM APPLIED AND COMPUTATIONAL TOPOLOGY AFRA ZOMORODIAN FOCUSES ON TOPOLOGICAL DATA ANALYSIS VIA EFFICIENT CONSTRUCTION OF COMBINATORIAL STRUCTURES AND RECENT THEORIES OF PERSISTENCE MARIAN MROZEK ANALYZES ASYMPTOTIC BEHAVIOR OF DYNAMICAL SYSTEMS VIA EFFICIENT COMPUTATION OF CUBICAL HOMOLOGY JUSTIN CURRY ROBERT GHRIST AND MICHAEL ROBINSON PRESENT EULER CALCULUS AN INTEGRAL CALCULUS BASED ON THE EULER CHARACTERISTIC AND APPLY IT TO SENSOR AND NETWORK DATA AGGREGATION MICHAEL ERDMANN EXPLORES THE RELATIONSHIP OF TOPOLOGY PLANNING AND PROBABILITY WITH THE STRATEGY COMPLEX JEFF ERICKSON SURVEYS ALGORITHMS AND HARDNESS RESULTS FOR TOPOLOGICAL OPTIMIZATION PROBLEMS

Research in Computational Topology 2 2022-05-10

THIS SECOND VOLUME OF RESEARCH IN COMPUTATIONAL TOPOLOGY IS A CELEBRATION AND PROMOTION OF RESEARCH BY WOMEN IN APPLIED AND COMPUTATIONAL TOPOLOGY CONTAINING THE PROCEEDINGS OF THE SECOND WORKSHOP FOR WOMEN IN COMPUTATIONAL TOPOLOGY WINCOMPTOP AS WELL AS PAPERS SOLICITED FROM THE BROADER WINCOMPTOP COMMUNITY THE MULTIDISCIPLINARY AND INTERNATIONAL WINCOMPTOP WORKSHOP PROVIDED AN EXCITING AND UNIQUE OPPORTUNITY FOR WOMEN IN DIVERSE LOCATIONS AND RESEARCH SPECIALIZATIONS TO INTERACT EXTENSIVELY AND COLLECTIVELY CONTRIBUTE TO NEW AND ACTIVE RESEARCH DIRECTIONS IN THE FIELD THE PRESTIGIOUS SENIOR RESEARCHERS THAT SIGNED ON TO HEAD PROJECTS AT THE WORKSHOP ARE GLOBAL LEADERS IN THE DISCIPLINE AND TWO OF THEM WERE AUTHORS ON SOME OF THE FIRST PAPERS IN THE FIELD SOME OF THE FEATURED TOPICS INCLUDE TOPOLOGICAL DATA ANALYSIS OF POWER LAW STRUCTURE IN NEURAL DATA A NERVE THEOREM FOR DIRECTIONAL GRAPH COVERS TOPOLOGICAL OR HOMOTOPICAL INVARIANTS FOR DIRECTED GRAPHS ENCODING CONNECTIONS AMONG A NETWORK OF NEURONS AND THE ISSUE OF APPROXIMATION OF OBJECTS BY DIGITAL GRIDS INCLUDING PRECISE RELATIONS BETWEEN THE PERSISTENT HOMOLOGY OF DUAL CUBICAL COMPLEXES

Computational Topology in Image Context 2019-01-10

THIS BOOK CONSTITUTES THE PROCEEDINGS OF THE 7TH INTERNATIONAL WORKSHOP ON COMPUTATIONAL TOPOLOGY IN IMAGE CONTEXT CTIC 2019 HELD IN MÁLAGA SPAIN IN JANUARY 2019 THE 14 PAPERS PRESENTED IN THIS VOLUME WERE CAREFULLY REVIEWED AND SELECTED FROM 21 SUBMISSIONS PAPERS DEAL WITH THEORETICAL ISSUES BUT MOST OF THEM PUT THE ATTENTION ON THE APPLICABILITY OF CONCEPTS AND ALGORITHMS THESE WERE DESIGNED TO DEAL WITH OBJECTS AND IMAGES BUT ALSO WITH THE SPEECH SIGNAL THE FINAL APPLICATION MUST BE FOR INSTANCE IN THE MEDICAL DOMAIN OR IN THE ROBOTICS ONE

Computational Topology in Image Context 2012-06-13

THIS BOOK CONSTITUTES THE PROCEEDINGS OF THE 4TH INTERNATIONAL WORKSHOP ON COMPUTATIONAL TOPOLOGY IN IMAGE CONTEXT CTIC 2012 HELD IN BERTINORO ITALY IN MAY 2012 THE 16 PAPERS PRESENTED IN THIS VOLUME WERE CAREFULLY REVIEWED AND SELECTED FOR INCLUSION IN THIS BOOK THEY FOCUS ON THE TOPOLOGY AND COMPUTATION IN IMAGE CONTEXT THE WORKSHOP IS DEVOTED TO COMPUTATIONAL METHODS USING TOPOLOGY FOR THE ANALYSIS AND COMPARISON OF IMAGES THE INVOLVED RESEARCH FIELDS COMPRISE COMPUTATIONAL TOPOLOGY AND GEOMETRY DISCRETE TOPOLOGY AND GEOMETRY GEOMETRICAL MODELING ALGEBRAIC TOPOLOGY FOR IMAGE APPLICATIONS AND ANY OTHER FIELD INVOLVING A GEOMETRIC TOPOLOGICAL APPROACH TO IMAGE PROCESSING

Computational Topology in Image Context 2016-06-01

THIS BOOK CONSTITUTES THE PROCEEDINGS OF THE 6TH INTERNATIONAL WORKSHOP ON COMPUTATIONAL TOPOLOGY IN IMAGE CONTEXT CTIC 2016 HELD IN MARSEILLE FRANCE IN JUNE 2016 THE 24 PAPERS PRESENTED IN THIS VOLUME WERE CAREFULLY REVIEWED AND SELECTED FROM 35 SUBMISSIONS ADDITIONALLY THIS VOLUME CONTAINS 2 INVITED PAPERS CTIC COVERS A WIDE RANGE OF TOPICS SUCH AS TOPOLOGICAL INVARIANTS AND THEIR COMPUTATION HOMOLOGY COHOMOLOGY LINKING NUMBER FUNDAMENTAL GROUPS ALGORITHM OPTIMIZATION IN DISCRETE GEOMETRY TRANSFER OF MATHEMATICAL TOOLS PARALLEL COMPUTATION IN MULTI DIMENSIONAL VOLUME CONTEXT HIERARCHICAL APPROACHES EXPERIMENTAL EVALUATION OF ALGORITHMS AND HEURISTICS COMBINATORIAL OR MULTI RESOLUTION MODELS DISCRETE OR COMPUTATIONAL TOPOLOGY GEOMETRIC MODELING GUIDED BY TOPOLOGICAL CONSTRAINTS COMPUTATIONAL TOPOLOGICAL DYNAMICS AND USE OF TOPOLOGICAL INFORMATION IN DISCRETE GEOMETRY APPLICATIONS

Research in Computational Topology 2018-07-30

BASED ON THE FIRST WORKSHOP FOR WOMEN IN COMPUTATIONAL TOPOLOGY THAT TOOK PLACE IN 2016 THIS VOLUME ASSEMBLES NEW RESEARCH AND APPLICATIONS IN COMPUTATIONAL TOPOLOGY FEATURED ARTICLES RANGE OVER THE BREADTH OF THE DISCIPLINE INCLUDING TOPICS SUCH AS SURFACE RECONSTRUCTION TOPOLOGICAL DATA ANALYSIS PERSISTENT HOMOLOGY ALGORITHMS AND SURFACE EMBEDDED GRAPHS APPLICATIONS IN GRAPHICS MEDICAL IMAGING AND GIS ARE DISCUSSED THROUGHOUT THE BOOK FOUR OF THE PAPERS IN THIS VOLUME ARE THE PRODUCT OF WORKING GROUPS THAT WERE ESTABLISHED AND DEVELOPED DURING THE WORKSHOP ADDITIONAL PAPERS WERE ALSO

SOLICITED FROM THE BROADER WOMEN IN COMPUTATIONAL TOPOLOGY NETWORK THE VOLUME IS ACCESSIBLE TO A BROAD RANGE OF RESEARCHERS BOTH WITHIN THE FIELD OF COMPUTATIONAL TOPOLOGY AND IN RELATED DISCIPLINES SUCH AS STATISTICS COMPUTATIONAL BIOLOGY AND MACHINE LEARNING

Singularities in Geometry and Topology 2007

SINGULARITY THEORY APPEARS IN NUMEROUS BRANCHES OF MATHEMATICS AS WELL AS IN MANY EMERGING AREAS SUCH AS ROBOTICS CONTROL THEORY IMAGING AND VARIOUS EVOLVING AREAS IN PHYSICS THE PURPOSE OF THIS PROCEEDINGS VOLUME IS TO COVER RECENT DEVELOPMENTS IN SINGULARITY THEORY AND TO INTRODUCE YOUNG RESEARCHERS FROM DEVELOPING COUNTRIES TO SINGULARITIES IN GEOMETRY AND TOPOLOGY THE CONTRIBUTIONS DISCUSS SINGULARITIES IN BOTH COMPLEX AND REAL GEOMETRY AS SUCH THEY PROVIDE A NATURAL CONTINUATION OF THE PREVIOUS SCHOOL ON SINGULARITIES HELD AT ICTP 1991 WHICH IS RECOGNIZED AS HAVING HAD A MAJOR INFLUENCE IN THE FIELD

Mathematics for Industry 2005-01-01

THE PAPERS WERE ELICITED PRIMARILY FROM MATHEMATICS FOR INDUSTRY CHALLENGES AND FRONTIERS A CONFERENCE SPONSORED BY SIAM IN OCTOBER 2003

Advances in Discrete and Computational Geometry 1999

THIS VOLUME IS A COLLECTION OF REFEREED EXPOSITORY AND RESEARCH ARTICLES IN DISCRETE AND COMPUTATIONAL GEOMETRY WRITTEN BY LEADERS IN THE FIELD ARTICLES ARE BASED ON INVITED TALKS PRESENTED AT THE AMS IMS SIAM SUMMER RESEARCH CONFERENCE DISCRETE AND COMPUTATIONAL GEOMETRY TEN YEARS LATER HELD IN 1996 AT MT HOLYOKE COLLEGE SO HADLEY MA TOPICS ADDRESSED RANGE FROM TILINGS POLYHEDRA AND ARRANGEMENTS TO COMPUTATIONAL TOPOLOGY AND VISIBILITY PROBLEMS INCLUDED ARE PAPERS ON THE INTERACTION BETWEEN REAL ALGEBRAIC GEOMETRY AND DISCRETE AND COMPUTATIONAL GEOMETRY AS WELL AS ON LINEAR PROGRAMMING AND GEOMETRIC DISCREPANCY THEORY

Topology 1976

THIS COLLECTION OF PEER REVIEWED WORKSHOP PAPERS PROVIDES COMPREHENSIVE COVERAGE OF CUTTING EDGE RESEARCH INTO TOPOLOGICAL APPROACHES TO DATA ANALYSIS AND VISUALIZATION IT ENCOMPASSES THE FULL RANGE OF NEW ALGORITHMS AND INSIGHTS INCLUDING FAST HOMOLOGY COMPUTATION COMPARATIVE ANALYSIS OF SIMPLIFICATION TECHNIQUES AND KEY APPLICATIONS IN MATERIALS AND MEDICAL SCIENCE THE BOOK ALSO ADDRESSES CORE RESEARCH CHALLENGES SUCH AS THE REPRESENTATION OF LARGE AND COMPLEX DATASETS AND INTEGRATING NUMERICAL METHODS WITH ROBUST COMBINATORIAL ALGORITHMS IN KEEPING WITH THE FOCUS OF THE TOPOINVIS 2017 WORKSHOP THE CONTRIBUTIONS REFLECT THE LATEST ADVANCES IN FINDING EXPERIMENTAL SOLUTIONS TO OPEN PROBLEMS IN THE SECTOR THEY PROVIDE AN ESSENTIAL SNAPSHOT OF STATE OF THE ART RESEARCH HELPING RESEARCHERS TO KEEP ABREAST OF THE LATEST DEVELOPMENTS AND PROVIDING A BASIS FOR FUTURE WORK GATHERING PAPERS BY SOME OF THE WORLD S LEADING EXPERTS ON TOPOLOGICAL TECHNIQUES THE BOOK REPRESENTS A VALUABLE CONTRIBUTION TO A FIELD OF GROWING IMPORTANCE WITH APPLICATIONS IN DISCIPLINES RANGING FROM ENGINEERING TO MEDICINE

Topological Methods in Data Analysis and Visualization V 2020-12-10

THE PROCEEDINGS OF AN INTERNATIONAL TOPOLOGY CONFERENCE THIS BOOK COVRS VARIOUS ASPECTS OF GENERAL ALGEBRAIC AND LOW DIMENSIONAL TOPOLOGY

Topology Proceedings 1977

THIS INTERDISCIPLINARY BOOK COVERS A WIDE RANGE OF SUBJECTS FROM PURE MATHEMATICS KNOTS BRAIDS HOMOTOPY THEORY NUMBER THEORY TO MORE APPLIED MATHEMATICS CRYPTOGRAPHY ALGEBRAIC SPECIFICATION OF ALGORITHMS DYNAMICAL SYSTEMS AND CONCRETE APPLICATIONS MODELING OF POLYMERS AND IONIC LIQUIDS VIDEO MUSIC AND MEDICAL IMAGING THE MAIN MATHEMATICAL FOCUS THROUGHOUT THE BOOK IS ON ALGEBRAIC MODELING WITH PARTICULAR EMPHASIS ON BRAID GROUPS THE RESEARCH METHODS INCLUDE ALGEBRAIC MODELING USING TOPOLOGICAL STRUCTURES SUCH AS KNOTS 3 MANIFOLDS CLASSICAL HOMOTOPY GROUPS AND BRAID GROUPS THE APPLICATIONS ADDRESS THE SIMULATION OF POLYMER CHAINS AND IONIC LIQUIDS AS WELL AS THE MODELING OF NATURAL PHENOMENA VIA TOPOLOGICAL SURGERY THE TREATMENT OF COMPUTATIONAL STRUCTURES INCLUDING FINITE FIELDS AND CRYPTOGRAPHY FOCUSES ON THE DEVELOPMENT OF NOVEL TECHNIQUES THESE TECHNIQUES CAN BE APPLIED TO THE DESIGN OF ALGEBRAIC SPECIFICATIONS FOR SYSTEMS MODELING AND VERIFICATION THIS BOOK IS THE OUTCOME OF A WORKSHOP IN CONNECTION WITH THE RESEARCH PROJECT THALES ON ALGEBRAIC MODELING OF TOPOLOGICAL AND COMPUTATIONAL STRUCTURES AND APPLICATIONS HELD AT THE NATIONAL TECHNICAL UNIVERSITY OF ATHENS GREECE IN JULY 2015 THE READER WILL BENEFIT FROM THE INNOVATIVE APPROACHES TO TACKLING DIFFICULT QUESTIONS IN TOPOLOGY APPLICATIONS AND INTERRELATED RESEARCH AREAS WHICH LARGELY EMPLOY ALGEBRAIC TOOLS

Topology and Its Applications *1993*

THIS BOOK IS A RESULT OF A WORKSHOP THE 8TH OF THE SUCCESSFUL TOPOINVIS WORKSHOP SERIES HELD IN 2019 IN NYKÖ PING SWEDEN THE WORKSHOP REGULARLY GATHERS SOME OF THE WORLD S LEADING EXPERTS IN THIS FIELD THEREBY IT PROVIDES A FORUM FOR DISCUSSIONS ON THE LATEST ADVANCES IN THE FIELD WITH A FOCUS ON FINDING PRACTICAL SOLUTIONS TO OPEN PROBLEMS IN TOPOLOGICAL DATA ANALYSIS FOR VISUALIZATION THE CONTRIBUTIONS PROVIDE INTRODUCTORY AND NOVEL RESEARCH ARTICLES INCLUDING NEW CONCEPTS FOR THE ANALYSIS OF MULTIVARIATE AND TIME DEPENDENT DATA ROBUST COMPUTATIONAL APPROACHES FOR THE EXTRACTION AND APPROXIMATIONS OF TOPOLOGICAL STRUCTURES WITH THEORETICAL GUARANTEES AND APPLICATIONS OF TOPOLOGICAL SCALAR AND VECTOR FIELD ANALYSIS FOR VISUALIZATION THE APPLICATIONS SPAN A WIDE RANGE OF SCIENTIFIC AREAS COMPRISING CLIMATE SCIENCE MATERIAL SCIENCES FLUID DYNAMICS AND ASTRONOMY IN ADDITION COMMUNITY EFFORTS WITH RESPECT TO JOINT SOFTWARE DEVELOPMENT ARE REPORTED AND DISCUSSED

Algebraic Modeling of Topological and Computational Structures and Applications *2017-12-14*

THIS BOOK GATHERS THE PROCEEDINGS OF THE 2018 ABEL SYMPOSIUM WHICH WAS HELD IN GEIRANGER NORWAY ON JUNE 4 8 2018 THE SYMPOSIUM OFFERED AN OVERVIEW OF THE EMERGING FIELD OF TOPOLOGICAL DATA ANALYSIS THIS VOLUME PRESENTS PAPERS ON VARIOUS RESEARCH DIRECTIONS NOTABLY INCLUDING APPLICATIONS IN NEUROSCIENCE MATERIALS SCIENCE CANCER BIOLOGY AND IMMUNE RESPONSE PROVIDING AN ESSENTIAL SNAPSHOT OF THE STATUS QUO IT REPRESENTS A VALUABLE ASSET FOR PRACTITIONERS AND THOSE CONSIDERING ENTERING THE FIELD

Topology *1976*

COMPUTATIONAL TOPOLOGYBY JOHN HARER

Categorical topology *2021-09-28*

COMBINING CONCEPTS FROM TOPOLOGY AND ALGORITHMS THIS BOOK DELIVERS WHAT ITS TITLE PROMISES AN INTRODUCTION TO THE FIELD OF COMPUTATIONAL TOPOLOGY STARTING WITH MOTIVATING PROBLEMS IN BOTH MATHEMATICS AND COMPUTER SCIENCE AND BUILDING UP FROM CLASSIC TOPICS IN GEOMETRIC AND ALGEBRAIC TOPOLOGY THE THIRD PART OF THE TEXT ADVANCES TO PERSISTENT HOMOLOGY THIS POINT OF VIEW IS CRITICALLY IMPORTANT IN TURNING A MOSTLY THEORETICAL FIELD OF MATHEMATICS INTO ONE THAT IS RELEVANT TO A MULTITUDE OF DISCIPLINES IN THE SCIENCES AND ENGINEERING THE MAIN APPROACH IS THE DISCOVERY OF TOPOLOGY THROUGH ALGORITHMS THE BOOK IS IDEAL FOR TEACHING A GRADUATE OR ADVANCED UNDERGRADUATE COURSE IN COMPUTATIONAL TOPOLOGY AS IT DEVELOPS ALL THE BACKGROUND OF BOTH THE MATHEMATICAL AND ALGORITHMIC ASPECTS OF THE SUBJECT FROM FIRST PRINCIPLES THUS THE TEXT COULD SERVE EQUALLY WELL IN A COURSE TAUGHT IN A MATHEMATICS DEPARTMENT OR COMPUTER SCIENCE DEPARTMENT

Topological Methods in Data Analysis and Visualization VI *2020-06-25*

THIS BOOK DISCUSSES THE COMPUTATIONAL GEOMETRY TOPOLOGY AND PHYSICS OF DIGITAL IMAGES AND VIDEO FRAME SEQUENCES THIS TRIO OF COMPUTATIONAL APPROACHES ENCOMPASSES THE STUDY OF SHAPE COMPLEXES OPTICAL VORTEX NERVES AND PROXIMITIES EMBEDDED IN TRIANGULATED VIDEO FRAMES AND SINGLE IMAGES WHILE COMPUTATIONAL GEOMETRY FOCUSES ON THE GEOMETRIC STRUCTURES THAT INFUSE TRIANGULATED VISUAL SCENES THE BOOK FIRST ADDRESSES THE TOPOLOGY OF CELLULAR COMPLEXES TO PROVIDE A BASIS FOR AN INTRODUCTORY STUDY OF THE COMPUTATIONAL TOPOLOGY OF VISUAL SCENES EXPLORING THE FABRIC SHAPES AND STRUCTURES TYPICALLY FOUND IN VISUAL SCENES THE BOOK THEN EXAMINES THE INHERENT GEOMETRY AND TOPOLOGY OF VISUAL SCENES AND THE FINE STRUCTURE OF LIGHT AND LIGHT CAUSTICS OF VISUAL SCENES WHICH BRING INTO PLAY CATASTROPHE THEORY AND THE APPEARANCE OF LIGHT CAUSTIC FOLDS AND CUSPS FOLLOWING ON FROM THIS THE BOOK INTRODUCES OPTICAL VORTEX NERVES IN TRIANGULATED DIGITAL IMAGES IN THIS CONTEXT COMPUTATIONAL PHYSICS IS SYNONYMOUS WITH THE STUDY OF THE FINE STRUCTURE OF LIGHT CHOREOGRAPHED IN VIDEO FRAMES THIS CHOREOGRAPHY APPEARS AS A SEQUENCE OF SNAPSHOTS OF LIGHT REFLECTED AND REFRACTED FROM SURFACE SHAPES PROVIDING A SOLID FOUNDATION FOR DETECTING ANALYZING AND CLASSIFYING VISUAL SCENE SHAPES

Topological Data Analysis *2014-10-13*

THE THEORY AND PRACTICE OF COMPUTATION IN ALGEBRAIC GEOMETRY AND RELATED DOMAINS FROM A MATHEMATICAL POINT OF VIEW HAS GENERATED AN INCREASING INTEREST BOTH FOR ITS RICH THEORETICAL POSSIBILITIES AND ITS USEFULNESS IN APPLICATIONS IN SCIENCE AND ENGINEERING IN FACT IT IS ONE OF THE MASTER KEYS FOR FUTURE SIGNIFICANT IMPROVEMENT OF THE COMPUTER ALGEBRA SYSTEMS E G REDUCE MACSYMA MAPLE MATHEMATICA AXIOM MACAULAY ETC THAT HAVE BECOME SUCH USEFUL TOOLS FOR MANY SCIENTISTS IN A VARIETY OF DISCIPLINES THE MAJOR THEMES COVERED IN THIS VOLUME ARISING FROM PAPERS P SENTED AT THE CONFERENCE MEGA 92 WERE EFFECTIVE METHODS AND COMPLEXITY ISSUES IN COMMUTATIVE ALGEBRA PROJECTIVE GEOMETRY REAL GEOMETRY AND ALGEBRAIC NUMBER THEORY ALGEBRA GEOMETRIC METHODS IN ALGEBRAIC COMPUTING AND APPLICA TIONS MEGA 92 WAS THE SECOND OF A NEW SERIES OF EUROPEAN CONFERENCES ON THE GENERAL THEME OF EFFECTIVE METHODS IN ALGEBRAIC GEOMETRY IT WAS HELD IN NICE FRANCE ON APRIL 21 25 1992 AND BUILT ON THE THEMES PRESENTED AT MEGA 90 LIVOMO ITALY APRIL 17 21 1990 THE NEXT CONFERENCE MEGA 94 WILL BE HELD IN SANTANDER SPAIN IN THE SPRING OF 1994 THE ORGANIZING COMMITTEE THAT INITIATIOD AND SUPERVISES THIS BI ENNIEL CONFERENCE

CONSISTS OF A CONTE TORINO J H DAVENPORT BATH A GALLIGO NICE D YU GRIGORIEV PETERSBURG J HEINTZ BUENOS AIRES W LASSNER LEIPZIG D LAZARD PARIS H M MOLLER HAGEN T MORA GENOVA M POHST DUSSELDORT T RECIO SANTANDER J J

Computational Topology 2022-01-31

TOPOLOGY BASED METHODS ARE OF INCREASING IMPORTANCE IN THE ANALYSIS AND VISUALIZATION OF DATASETS FROM A WIDE VARIETY OF SCIENTIFIC DOMAINS SUCH AS BIOLOGY PHYSICS ENGINEERING AND MEDICINE CURRENT CHALLENGES OF TOPOLOGY BASED TECHNIQUES INCLUDE THE MANAGEMENT OF TIME DEPENDENT DATA THE REPRESENTATION OF LARGE AND COMPLEX DATASETS THE CHARACTERIZATION OF NOISE AND UNCERTAINTY THE EFFECTIVE INTEGRATION OF NUMERICAL METHODS WITH ROBUST COMBINATORIAL ALGORITHMS ETC THE EDITORS HAVE BROUGHT TOGETHER THE MOST PROMINENT AND BEST RECOGNIZED RESEARCHERS IN THE FIELD OF TOPOLOGY BASED DATA ANALYSIS AND VISUALIZATION FOR A JOINT DISCUSSION AND SCIENTIFIC EXCHANGE OF THE LATEST RESULTS IN THE FIELD THIS BOOK CONTAINS THE BEST 20 PEER REVIEWED PAPERS RESULTING FROM THE DISCUSSIONS AND PRESENTATIONS AT THE THIRD WORKSHOP ON TOPOLOGICAL METHODS IN DATA ANALYSIS AND VISUALIZATION HELD 2009 IN SNOWBIRD UTAH US THE 2009 TOPOINVIS WORKSHOP FOLLOWS THE TWO SUCCESSFUL WORKSHOPS IN 2005 SLOVAKIA AND 2007 GERMANY

Computational Topology 2019-10-03

THE INTERPLAY BETWEEN ALGEBRA AND GEOMETRY IS A BEAUTIFUL AND FUN AREA OF MATHEMATICAL INVESTIGATION ADVANCES IN COMPUTING AND ALGORITHMS MAKE IT POSSIBLE TO TACKLE MANY CLASSICAL PROBLEMS IN A DOWN TO EARTH AND CONCRETE FASHION THIS OPENS WONDERFUL NEW VISTAS AND ALLOWS US TO POSE STUDY AND SOLVE PROBLEMS THAT WERE PREVIOUSLY OUT OF REACH SUITABLE FOR GRADUATE STUDENTS THE OBJECTIVE OF THIS 2003 BOOK IS TO BRING ADVANCED ALGEBRA TO LIFE WITH LOTS OF EXAMPLES THE FIRST CHAPTERS PROVIDE AN INTRODUCTION TO COMMUTATIVE ALGEBRA AND CONNECTIONS TO GEOMETRY THE REST OF THE BOOK FOCUSES ON THREE ACTIVE AREAS OF CONTEMPORARY ALGEBRA HOMOLOGICAL ALGEBRA THE SNAKE LEMMA LONG EXACT SEQUENCE INHOMOLOGY FUNCTORS AND DERIVED FUNCTORS TOR AND EXT AND DOUBLE COMPLEXES ALGEBRAIC COMBINATORICS AND ALGEBRAIC TOPOLOGY SIMPLICIAL COMPLEXES AND SIMPLICIAL HOMOLOGY STANLEY REISNER RINGS UPPER BOUND THEOREM AND POLYTOPES AND ALGEBRAIC GEOMETRY POINTS AND CURVES IN PROJECTIVE SPACE RIEMANN ROCH CECH COHOMOLOGY REGULARITY

Computational Geometry, Topology and Physics of Digital Images with Applications 2012-12-06

THIS BOOK CONTAINS A COLLECTION OF ARTICLES CORRESPONDING TO SOME OF THE TALKS DELIVERED AT THE FOUNDATIONS OF COMPUTATIONAL MATHEMATICS CONFERENCE HELD AT IMPA IN RIO DE JANEIRO IN JANUARY 1997 SOME OFTHE OTHERS ARE PUBLISHED IN THE DECEMBER 1996 ISSUE OF THE JOURNAL OF COMPLEXITY BOTH OF THESE PUBLICATIONS WERE AVAILABLE AND DISTRIBUTED AT THE MEETING EVEN IN THIS ASPECT WE HOPE TO HAVE ACHIEVED A SYNTHESIS OF THE MATHEMATICS AND COMPUTER SCIENCE CULTURES AS WELL AS OF THE DISCIPLINES THE REACTION TO THE PARK CITY MEETING ON MATHEMATICS OF NUMERICAL ANALY SIS REAL NUMBER ALGORITHMS WHICH WAS CHAIRED BY STEVE SMALE AND HAD AROUND 275 PARTICIPANTS WAS VERY ENTHUSIASTIC AT THE SUGGESTION OF NARENDRA KARMAR MAR A LUNCH TIME MEETING OF FELIPE CUCKER ARIEH ISERLES NARENDRA KARMARKAR JIM RENEGAR MIKE SHUB AND STEVE SMALE DECIDED TO TRY TO HOLD A PERIODIC MEETING ENTITLED FOUNDATIONS OF COMPUTATIONAL MATHEMATICS AND TO FORM AN ORGANIZATION WITH THE SAME NAME WHOSE PRIMARY PURPOSE WILL BE TO HOLD THE MEETING THIS IS THEN THE FIRST EDITION OF FOCM AS SUCH IT HAS BEEN ORGANIZED AROUND A SMALL COLLECTION OF WORKSHOPS NAMELY SYSTEMS OF ALGEBRAIC EQUATIONS AND COMPUTATIONAL ALGEBRAIC GEOMETRY HOMOTOPY METHODS AND REAL MACHINES INFORMATION BASED COMPLEXITY NUMERICAL LINEAR ALGEBRA APPROXIMATION AND PDES OPTIMIZATION DIFFERENTIAL EQUATIONS AND DYNAMICAL SYSTEMS RELATIONS TO COMPUTER SCIENCE VISION AND RELATED COMPUTATIONAL TOOLS THERE WERE ALSO TWELVE PLENARY SPEAKERS

Computational Algebraic Geometry 2010-11-23

IN THIS CHAPTER WE INTRODUCE SOME OF THE VERY BASICS THAT ARE USED THROUGHOUT THE BOOK FIRST WE GIVE THE DEFINITION OF A TOPOLOGICAL SPACE AND RELATED NOTIONS OF OPEN AND CLOSED SETS COVERS SUBSPACE TOPOLOGY TO CONNECT TOPOLOGY AND GEOMETRY WE DEVOTE A SECTION ON METRIC SPACES MAPS SUCH AS HOMEOMORPHISM AND HOMOTOPY EQUIVALENCE THAT PLAY A SIGNIFICANT ROLE TO RELATE TOPOLOGICAL SPACES CERTAIN CATEGORIES OF TOPOLOGICAL SPACES BECOME IMPORTANT FOR THEIR WIDE PRESENCE IN APPLICATIONS MANIFOLDS ARE ONE SUCH CATEGORY WHICH WE INTRODUCE IN THIS CHAPTER FUNCTIONS ON THEM SATISFYING CERTAIN CONDITIONS ARE PRESENTED AS MORSE FUNCTIONS THE CRITICAL POINTS OF SUCH FUNCTIONS RELATE TO THE TOPOLOGY OF THE MANIFOLD THEY ARE DEFINED ON WE INTRODUCE THESE CONCEPTS IN THE SMOOTH SETTING IN THIS CHAPTER AND LATER ADAPT THEM FOR THE PIECEWISE LINEAR DOMAINS FREQUENTLY USED FOR FINITE COMPUTATIONS FINALLY A SECTION ON NOTES POINTS OUT TO THE HISTORY AND RELEVANT LITERATURE FOR THE CONCEPTS DELINEATED IN THE CHAPTER IT ENDS WITH A SERIES OF EXERCISES THAT MAY BE USED FOR TEACHING A CLASS ON THE SUBJECT BOTH AT GRADUATE AND UNDERGRADUATE LEVEL

Topological Methods in Data Analysis and Visualization 2003-10-06

NUMEROUS WELL PRESENTED AND IMPORTANT PAPERS FROM THE CONFERENCE ARE GATHERED IN THE PROCEEDINGS FOR THE PURPOSE OF POINTING DIRECTIONS FOR USEFUL FUTURE RESEARCH IN DIVERSE AREAS OF MATHEMATICS INCLUDING ALGEBRAIC GEOMETRY ANALYSIS COMMUTATIVE ALGEBRA COMPLEX ANALYSIS DISCRETE MATHEMATICS DYNAMICAL SYSTEMS NUMBER THEORY AND TOPOLOGY SEVERAL PAPERS ON COMPUTATIONAL AND APPLIED MATHEMATICS SUCH AS WAVELET ANALYSIS QUANTUM MECHANICS PIECEWISE LINEAR MODELING

COSMOLOGICAL MODELS OF SUPER SYMMETRY FLUID DYNAMICS INTERPOLATION THEORY OPTIMIZATION ERGODIC THEORY AND GAMES THEORY ARE ALSO PRESENTED

Computational Algebraic Geometry 2012-12-06

THE THREE VOLUME SET LNCS 2667 LNCS 2668 AND LNCS 2669 CONSTITUTES THE REFEREED PROCEEDINGS OF THE INTERNATIONAL CONFERENCE ON COMPUTATIONAL SCIENCE AND ITS APPLICATIONS ICCSA 2003 HELD IN MONTREAL CANADA IN MAY 2003 THE THREE VOLUMES PRESENT MORE THAN 300 PAPERS AND SPAN THE WHOLE RANGE OF COMPUTATIONAL SCIENCE FROM FOUNDATIONAL ISSUES IN COMPUTER SCIENCE AND MATHEMATICS TO ADVANCED APPLICATIONS IN VIRTUALLY ALL SCIENCES MAKING USE OF COMPUTATIONAL TECHNIQUES THE PROCEEDINGS GIVE A UNIQUE ACCOUNT OF RECENT RESULTS IN COMPUTATIONAL SCIENCE

Foundations of Computational Mathematics 2022

THIS INVALUABLE BOOK CONTAINS 19 PAPERS SELECTED FROM THOSE SUBMITTED TO A CONFERENCE HELD IN HONG KONG IN JULY 2000 TO CELEBRATE THE 70TH BIRTHDAY OF PROFESSOR STEVE SMALE IT MAY BE REGARDED AS A CONTINUATION OF THE PROCEEDINGS OF SMALEFEST 1990 FROM TOPOLOGY TO COMPUTATION HELD IN BERKELEY USA 10 YEARS BEFORE BUT WITH THE FOCUS ON THE AREA IN WHICH SMALE WORKED MORE INTENSIVELY DURING THE 90 S NAMELY THE FOUNDATIONS OF COMPUTATIONAL MATHEMATICS

Computational Topology for Data Analysis 1975

ANALYSIS AND COMPUTATION OF FIXED POINTS CONTAINS THE PROCEEDINGS OF A SYMPOSIUM ON ANALYSIS AND COMPUTATION OF FIXED POINTS HELD AT THE UNIVERSITY OF WISCONSIN MADISON ON MAY 7 8 1979 THE PAPERS FOCUS ON THE ANALYSIS AND COMPUTATION OF FIXED POINTS AND COVER TOPICS RANGING FROM PATHS GENERATED BY FIXED POINT ALGORITHMS TO STRONGLY STABLE STATIONARY SOLUTIONS IN NONLINEAR PROGRAMS A SIMPLE RELIABLE NUMERICAL ALGORITHM FOR FOLLOWING HOMOTOPY PATHS IS ALSO PRESENTED COMPRISED OF NINE CHAPTERS THIS BOOK BEGINS BY DESCRIBING THE TECHNIQUES OF NUMERICAL LINEAR ALGEBRA THAT POSSESS ATTRACTIVE STABILITY PROPERTIES AND EXPLOIT SPARSITY AND THEIR APPLICATION TO THE LINEAR SYSTEMS THAT ARISE IN ALGORITHMS THAT SOLVE EQUATIONS BY CONSTRUCTING PIECEWISE LINEAR HOMOTOPIES THE READER IS THEN INTRODUCED TO TWO TRIANGULATIONS FOR HOMOTOPY FIXED POINT ALGORITHMS WITH AN ARBITRARY GRID REFINEMENT FOLLOWED BY A DISCUSSION ON SOME GENERIC PROPERTIES OF PATHS GENERATED BY FIXED POINT ALGORITHMS SUBSEQUENT CHAPTERS DEAL WITH TOPOLOGICAL PERTURBATIONS IN THE NUMERICAL STUDY OF NONLINEAR EIGENVALUE AND BIFURCATION PROBLEMS GENERAL EQUILIBRIUM ANALYSIS OF TAXATION POLICY AND SOLVING URBAN GENERAL EQUILIBRIUM MODELS BY FIXED POINT METHODS THE BOOK CONCLUDES WITH AN EVALUATION OF ECONOMIC EQUILIBRIUM UNDER DEFORMATION OF THE ECONOMY THIS MONOGRAPH SHOULD BE OF INTEREST TO STUDENTS AND SPECIALISTS IN THE FIELD OF MATHEMATICS

Geometric Topology : Proceedings of the Geometric Topology Conference Held At Park City, Utah, February 19-22, 1974 2014-01-15

THIS BOOK PROVIDES AN ACCESSIBLE YET RIGOROUS INTRODUCTION TO TOPOLOGY AND HOMOLOGY FOCUSED ON THE SIMPLICIAL SPACE IT PRESENTS A COMPACT PIPELINE FROM THE FOUNDATIONS OF TOPOLOGY TO BIOMEDICAL APPLICATIONS IT WILL BE OF INTEREST TO MEDICAL PHYSICISTS COMPUTER SCIENTISTS AND ENGINEERS AS WELL AS UNDERGRADUATE AND GRADUATE STUDENTS INTERESTED IN THIS TOPIC FEATURES PRESENTS A PRACTICAL GUIDE TO ALGEBRAIC TOPOLOGY AS WELL AS PERSISTENCE HOMOLOGY CONTAINS APPLICATION EXAMPLES IN THE FIELD OF BIOMEDICINE INCLUDING THE ANALYSIS OF HISTOLOGICAL IMAGES AND POINT CLOUD DATA

Singularities in Geometry and Topology 2014-11-15

TOPOLOGICAL AND GEOMETRIC MODELING IMPLICIT SURFACES ANALYZING AND TRANSFORMING SHAPES VOLUME MODELING AND APPLICATIONS ARE AMONG THE CONCERNS OF THE 32 PAPERS SELECTED FOR PUBLICATION THE SEVEN INVITED PAPERS DISCUSS VALID VERSUS INVALID COMPUTATIONAL SHAPE MODELING COMPUTATIONAL TOPOLOGY FOR

Geometry and Topology 2003-05-08

THIS VOLUME CONTAINS THE PROCEEDINGS OF THE 16TH CAROLINA DYNAMICS SYMPOSIUM HELD FROM APRIL 13 15 2018 AT AGNES SCOTT COLLEGE DECATUR GEORGIA THE PAPERS COVER VARIOUS TOPICS IN DYNAMICS AND RANDOMNESS INCLUDING COMPLEX DYNAMICS ERGODIC THEORY TOPOLOGICAL DYNAMICS CELESTIAL MECHANICS SYMBOLIC DYNAMICS COMPUTATIONAL TOPOLOGY RANDOM PROCESSES AND REGULAR LANGUAGES THE INTENT IS TO PROVIDE A GLIMPSE OF THE RICHNESS OF THE FIELD AND OF THE COMMON THREADS THAT TIE THE DIFFERENT SPECIALTIES TOGETHER

Mathematics in the 21st Century 2002

THIS VOLUME CONTAINS THE PROCEEDINGS OF THE VIRTUAL WORKSHOP ON COMPUTATIONAL ASPECTS OF DISCRETE SUBGROUPS OF LIE GROUPS HELD FROM JUNE 14 TO JUNE 18 2021 AND HOSTED BY THE INSTITUTE FOR COMPUTATIONAL AND EXPERIMENTAL RESEARCH IN MATHEMATICS ICERM PROVIDENCE RHODE ISLAND THE MAJOR THEME DEALS WITH A NOVEL DOMAIN OF COMPUTATIONAL ALGEBRA THE DESIGN IMPLEMENTATION AND APPLICATION OF ALGORITHMS BASED ON MATRIX REPRESENTATION OF GROUPS AND THEIR GEOMETRIC PROPERTIES IT IS

CENTERED ON COMPUTING WITH DISCRETE SUBGROUPS OF LIE GROUPS WHICH IMPACTS MANY DIFFERENT AREAS OF MATHEMATICS SUCH AS ALGEBRA GEOMETRY TOPOLOGY AND NUMBER THEORY THE WORKSHOP AIMED TO SYNERGIZE INDEPENDENT STRANDS IN THE AREA OF COMPUTING WITH DISCRETE SUBGROUPS OF LIE GROUPS TO FACILITATE SOLUTION OF THEORETICAL PROBLEMS BY MEANS OF RECENT ADVANCES IN COMPUTATIONAL ALGEBRA

Computational Science and Its Applications - ICCSA 2003 1979

THIS BOOK PROVIDES FORMAL AND INFORMAL DEFINITIONS AND TAXONOMIES FOR SELF AWARE COMPUTING SYSTEMS AND EXPLAINS HOW SELF AWARE COMPUTING RELATES TO MANY EXISTING SUBFIELDS OF COMPUTER SCIENCE ESPECIALLY SOFTWARE ENGINEERING IT DESCRIBES ARCHITECTURES AND ALGORITHMS FOR SELF AWARE SYSTEMS AS WELL AS THE BENEFITS AND PITFALLS OF SELF AWARENESS AND REVIEWS MUCH OF THE LATEST RELEVANT RESEARCH ACROSS A WIDE ARRAY OF DISCIPLINES INCLUDING OPEN RESEARCH CHALLENGES THE CHAPTERS OF THIS BOOK ARE ORGANIZED INTO FIVE PARTS INTRODUCTION SYSTEM ARCHITECTURES METHODS AND ALGORITHMS APPLICATIONS AND CASE STUDIES AND OUTLOOK PART I OFFERS AN INTRODUCTION THAT DEFINES SELF AWARE COMPUTING SYSTEMS FROM MULTIPLE PERSPECTIVES AND ESTABLISHES A FORMAL DEFINITION A TAXONOMY AND A SET OF REFERENCE SCENARIOS THAT HELP TO UNIFY THE REMAINING CHAPTERS NEXT PART II EXPLORES ARCHITECTURES FOR SELF AWARE COMPUTING SYSTEMS SUCH AS GENERIC CONCEPTS AND NOTATIONS THAT ALLOW A WIDE RANGE OF SELF AWARE SYSTEM ARCHITECTURES TO BE DESCRIBED AND COMPARED WITH BOTH ISOLATED AND INTERACTING SYSTEMS IT ALSO REVIEWS THE CURRENT STATE OF REFERENCE ARCHITECTURES ARCHITECTURAL FRAMEWORKS AND LANGUAGES FOR SELF AWARE SYSTEMS PART III FOCUSES ON METHODS AND ALGORITHMS FOR SELF AWARE COMPUTING SYSTEMS BY ADDRESSING ISSUES PERTAINING TO SYSTEM DESIGN LIKE MODELING SYNTHESIS AND VERIFICATION IT ALSO EXAMINES TOPICS SUCH AS ADAPTATION BENCHMARKS AND METRICS PART IV THEN PRESENTS APPLICATIONS AND CASE STUDIES IN VARIOUS DOMAINS INCLUDING CLOUD COMPUTING DATA CENTERS CYBER PHYSICAL SYSTEMS AND THE DEGREE TO WHICH SELF AWARE COMPUTING APPROACHES HAVE BEEN ADOPTED WITHIN THOSE DOMAINS LASTLY PART V SURVEYS OPEN CHALLENGES AND FUTURE RESEARCH DIRECTIONS FOR SELF AWARE COMPUTING SYSTEMS IT CAN BE USED AS A HANDBOOK FOR PROFESSIONALS AND RESEARCHERS WORKING IN AREAS RELATED TO SELF AWARE COMPUTING AND CAN ALSO SERVE AS AN ADVANCED TEXTBOOK FOR LECTURERS AND POSTGRADUATE STUDENTS STUDYING SUBJECTS LIKE ADVANCED SOFTWARE ENGINEERING AUTONOMIC COMPUTING SELF ADAPTIVE SYSTEMS AND DATA CENTER RESOURCE MANAGEMENT EACH CHAPTER IS LARGELY SELF CONTAINED AND OFFERS PLENTY OF REFERENCES FOR ANYONE WISHING TO PURSUE THE TOPIC MORE DEEPLY

Foundations of Computational Mathematics 2014-05-10

Geometric Topology 2019-07-12

Analysis and Computation of Fixed Points 1999

Computational Topology for Biomedical Image and Data Analysis 2019-09-23

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