RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL

New Scheme Based On AICTE Flexible Curricula

Artificial Intelligence & Data Science, VII-Semester

AD-701 AI for Computer Vision

Course Objectives:

1. To understand the fundamental concepts related to Image formation and processing.
2. To learn feature detection, matching and detection.
3. To become familiar with feature based alignment and motion estimation.
4. To develop skills on 3D reconstruction.
5. To understand image based rendering and recognition.

Course Outcomes:

After the completion of this course, the students will be able to:

1: Understand basic knowledge, theories and methods in image processing and computer vision.
2: Implement basic and some advanced image processing techniques in OpenCV.
3: Apply 2D a feature-based based image alignment, segmentation and motion estimations.
4: Apply 3D image reconstruction techniques.
5: Design and develop innovative image processing and computer vision applications.

Syllabus

Unit I: Introduction to Image Formation and Processing

Computer Vision, Geometric primitives and transformations, Photometric image formation, digital camera, Point operators, Linear filtering, More neighborhood operators, Fourier transforms, Pyramids and wavelets, Geometric transformations, Global optimization.

Unit II: Feature Detection, Matching and Segmentation

Points and patches, Edges, Lines, Segmentation, Active contours, Split and merge, Mean shift and mode finding, Normalized cuts, Graph cuts and energy-based methods.

UnitIII:**Feature-based Alignment & Motion Estimation**

2D and 3D feature-based alignment, Pose estimation, Geometric intrinsic calibration, Triangulation, Two-frame structure from motion, Factorization, Bundle adjustment, Constrained structure and motion, Translational alignment, Parametric motion, Spline-based motion, Optical flow, Layered motion.

Unit IV: **3D Reconstruction**

Shape from X, Active range finding, Surface representations, Point-based representations Volumetric representations, Model-based reconstruction, Recovering texture maps and albedos.

UnitV:**Image-based Rendering and Recognition**

View interpolation Layered depth images, Light fields and Lumigraphs, Environment mattes, Video-based rendering, Object detection, Face recognition, Instance recognition, Category recognition, Context and scene understanding, Recognition databases and test sets.

TEXT BOOKS:

1. Richard Szeliski, "Computer Vision: Algorithms and Applications", Springer- Texts in Computer Science, Second Edition, 2022.
2. D. A. Forsyth, J. Ponce, "Computer Vision: A Modern Approach", Pearson Education, Second Edition, 2015.

REFERENCE BOOKS:

1. Richard Hartley and Andrew Zisserman, "Multiple View Geometry in Computer Vision", Second Edition, Cambridge University Press, March 2004.
2. Christopher M. Bishop, "Pattern Recognition and Machine Learning", Springer, 2006
3. E. R. Davies, "Computer and Machine Vision", Fourth Edition, Academic Press, 2012.

LABORATORY EXPERIMENTS:

1. OpenCV Installation and working with Python
2. Basic Image Processing , loading images, Cropping, Resizing, Thresholding, Contour analysis, Bolb detection
3. Image Annotation – Drawing lines, text circle, rectangle, ellipse on images
4. Image Enhancement, Understanding Color spaces, color space conversion, Histogram equialization, Convolution, Image smoothing, Gradients, Edge Detection
5. Image Features and Image Alignment – Image transforms – Fourier, Hough, Extract ORB Image features, Feature matching and cloning
6. Feature matching based image alignment
7. Image segmentation using Graphcut / Grabcut
8. Camera Calibration with circular grid
9. Pose Estimation
10. 3D Reconstruction – Creating Depth map from stereo images

RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL

New Scheme Based On AICTE Flexible Curricula

Artificial Intelligence & Data Science, VII-Semester

Departmental Elective-702 (A) Cloud Computing

Aim:

Thiscoursegivesstudentsaninsightintothebasicsofcloudcomputingalongwithvirtualization,Utility Computing,ElasticComputing&gridcomputing.Itwillprovidethestudentsbasicunderstandingaboutc loudapplications andimplementations.ItwillalsoprovideanunderstandingofIssuesandChallengeswhile migratingto CloudComputing.

CourseObjectives:

1. Explain the core concepts of the cloud computing paradigm, the characteristic and advantages of cloud computing.
2. Explain the concept of Virtualization, Utility Computing, Elastic Computing & grid computing.
3. Identify resource management fundamentals, i.e., resource abstraction, managing infrastructure in cloud computing, apply the fundamental concepts to understand the trade-offs in power, efficiency and cost in cloud paradigm.
4. Study Issues and Challenges while migrating to Cloud Computing technologies, applications and implementations.
5. Study of various Open Source and Commercial Cloud Computing Platforms.

CourseOutcomes:

After the completion of this course, the students will be able to:

1. Understand Cloud Computing, its characteristic and advantages.
2. Understand the concept of Virtualization Utility Computing, Elastic Computing & grid computing.
3. Apply cloud resource management fundamental to utilize there sources efficiently and cost effectively in cloud paradigm.
4. Understand Cloud security fundamentals & Issues in cloud computing
5. Develop real life Cloud Computing based projects.

Syllabus

Unit I: Introduction To Cloud Computing: Definition, Characteristics, Components, Cloud Architecture: Software as a Service, Plat form as a Service, Infrastructure as Service. Cloud deployment model: Public clouds–Private clouds–Community clouds-Hybrid clouds-Advantages of Cloud computing. Comparing cloud providers with traditional IT service providers.

Unit II: Services Virtualization Technology and Study of Hypervisor: Utility Computing, Elastic computing & grid computing. Study of Hypervisor Virtualization applications in enterprises, High-performance computing, Pitfalls of virtualization Multitenant software: Multi-entity support, Multi schema approach.

Unit III: Installing cloud platforms and performance evaluation: Organizational scenarios of clouds, Administering & Monitoring cloud services, load balancing, Resource optimization, Resource dynamic reconfiguration, implementing real time application, Mobile Cloud Computing and edge computing.

Unit IV: Cloud security fundamentals & Issues in cloud computing: Secure Execution Environments and Communications in cloud, General Issues and Challenges while migrating toCloud. The Seven-step model of migration into a cloud, Vulnerability assessment tool for cloud, Trusted Cloud computing, Virtualization security management-virtual threats,VM Security Recommendations and VM-Specific Security techniques.QOS Issues in Cloud, Depend ability, data migration, challenges and risks in cloud adoption.

UnitV: Case Study on Open Source and Commercial Clouds: Open Stack, Eucalyptus, Open Nebula, Apache Cloud Stack, Amazon (AWS),Microsoft Azure, Google cloud etc.

TextBook(s)

1. Barrie Sosinsky:"CloudComputingBible",Wiley□India,2010
2. Rajkumar Buyya, James Broberg, Andrzej M. Goscinski: "Cloud Computing: Principles and Paradigms",Wiley, 2013.
3. RajkumarBuyya,ChristianVecchiola,S.Thamaraselvi,"MasteringCloudComputing",McGraw Hill, 2013.

ReferenceBooks

1. NikosAntonopoulos,LeeGillam:"CloudComputing:Principles,Systemsand Applications",Springer,2012
2. Ronald L. Krutz, Russell Dean Vines: "Cloud Security: A Comprehensive Guide to Secure CloudComputing", Wiley□India,2010
3. TimMalhar,S.Kumaraswammy,S.Latif,"CloudSecurity&Privacy",SPD,O'REILLY, 2009
4. Cloud Computing: Fundamentals, Industry Approach and Trends by Rishabh Sharma - John Wiley Publication.

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New Scheme Based On AICTE Flexible Curricula

Artificial Intelligence & Data Science, VII-Semester

Departmental Elective-702 (B) Business Intelligence

Prerequisites:Basic probability, statistics, and Data Mining

Objective: This course covers fundamental concepts of Business Intelligence tools, techniques, components and its future. As well as a bit more formal understanding of data visualization data analysis tools and techniques concepts and techniques.

Course Outcomes:

After the completion of this course, the students will be able to:

1. Describe the basic components and fundamentals of BI.
2. Link data mining with business intelligence.
3. Understand the modeling aspects behind Business Intelligence.
4. Explain the data analysis and knowledge delivery stages.
5. Apply business intelligence methods to various situations and able to visualize the result.

Syllabus

UnitI : Introduction to Business Intelligence

Business Intelligence (BI), Scope of BI solutions and their fitting into existing infrastructure, BI Components, Future of Business Intelligence, Functional areas and description of BI tools, Data mining & warehouse, OLAP, Drawing insights from data: DIKW pyramid Business Analytics project methodology - detailed description of each phase.

Unit II: Business Intelligence Implementation:
Key Drivers, Key Performance Indicators and Performance Metrics, BI Architecture/Framework, Best Practices, Business Decision Making, Styles of BI-vent-Driven alerts – A cyclic process of Intelligence Creation, Ethics of Business Intelligence.

UnitIII:Decision Support System
Representation of decision-making system, evolution of information system, definition and development of decision support system,Decision Taxonomy Principles of Decision Management Systems.

Unit IV: Analysis & Visualization

Definition and applications of data mining, data mining process, analysis methodologies, Typical pre-processing operations: combining values into one, handling incomplete or incorrect data, handling missing values, recoding values, sub setting, sorting, transforming scale, determining percentiles, data manipulation, removing noise, removing inconsistencies, transformations, standardizing, normalizing,min-max normalization, z-score. standardization,

rules of standardizing data. Role of visualization in analytics, different techniques for visualizing data.

UnitV: Business Intelligence Applications

Marketing models: Relational marketing, Salesforce management, Business case studies, supplychain optimization, optimization models for logistics planning, revenue management system.

Text Books:

1. Rajiv Sabherwal “Business Intelligence” Wiley Publications, 2012
2. Efraim Turban, Ramesh Sharda, Dursun Delen, “Decision Support and Business Intelligence Systems”, 9th Edition, Pearson 2013
3. S.K. Shinde and Uddagiri Chandrashekhar ,Data Mining and Business Intelligence (Includes Practicals), Dreamtech Press (1 January 2015)

Reference Books:

1. Business Intelligence and Data Mining – by Anil K Maheshwari, publisher Business Expert Press- 2014.
2. Philo Janus, Stacia Misner, Building Integrated Business Intelligence Solutions with SQL, Server, 2008 R2 & Office 2010, TMH, 2011.
3. Business Intelligence Data Mining and Optimization for decision-making [Author: Carlo-Verellis][Publication: (Wiley) 2009].

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New Scheme Based On AICTE Flexible Curricula

Artificial Intelligence & Data Science, VII-Semester

Departmental Elective-702 (C) Computational Intelligence

Course Outcomes:

After completing the course student should be able to:

1. Describe in-depth about theories, methods, and algorithms in computation Intelligence.
2. Compare and contrast traditional algorithms with nature inspired algorithms.
3. Examine the nature of a problem at hand and determine whether a computation intelligent technique/algorithm can solve it efficiently enough.
4. Understand Swarm Intelligence techniques.
5. Design and implement Computation Intelligence algorithms and approaches for solving real-life problems.

Syllabus

UnitI: **Introduction to Computational Intelligence**: Types of Computational Intelligence, components of Computational Intelligence. Concept of Learning, Training model. Parametric Models, Nonparametric Models. Multilayer Networks: Feed Forward network, Feedback network.

UnitII:Fuzzy Systems: Fuzzy set theory: Fuzzy sets and operations, Membership Functions, Concept of Fuzzy relations and their composition, Concept of Fuzzy Measures; Fuzzy Logic: Fuzzy Rules, Inferencing; Fuzzy Control - Selection of Membership Functions, Fuzzyfication, Rule Based Design & Inferencing, Defuzzyfication.

UnitIII:Genetic Algorithms: Basic Genetics, Concepts, Working Principle, Creation of Offspring, Encoding, Fitness Function, Selection Functions, Genetic Operators-Reproduction, Crossover, Mutation; Genetic Modelling, Benefits.

UnitIV:Rough Set Theory: Introduction, Fundamental Concepts, Set approximation, Rough membership, Attributes, Optimization. Hidden Markov Models, Decision tree model.

UnitV:Introduction to Swarm Intelligence: Swarm Intelligence Techniques: Ant Colony Optimization, Particle Swarm Optimization, Bee Colony Optimization etc. Applications of Computational Intelligence.

Recommended Books:

1. Russell C. Eberhart and Yuhui Shi, Computational Intelligence: Concepts to Implementations, Morgan Kaufmann Publishers.
2. Andries P. Engelbrecht, Computational Intelligence: An Introduction, Wiley Publishing.
3. Simon Haykin, Neural Networks: A Comprehensive Foundation, Prentice Hall.
4. David E. Goldberg, Genetic Algorithm in Search Optimization and Machine

Learning, Pearson Education.
6. Jagdish Chand Bansal, Pramod Kumar Singh, Nikhil R. Pal, Evolutionary and Swarm IntelligenceAlgorithms, Springer Publishing, 2019.
7. S. Rajeskaran, G.A. VijaylakshmiPai, “Neural Networks, Fuzzy Logic, GeneticAlgorithmsSynthesis and Applications”.
8. J.S. Roger Jang, C.T. Sun, E. Mizutani, “Neuro-Fuzzy and Soft Computing: A ComputationalApproach to Learning & Machine Intelligence”, PHI, 2002.

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New Scheme Based On AICTE Flexible Curricula

Artificial Intelligence & Data Science, VII-Semester

Departmental Elective-702 (D) Predictive Analytics

Course Objectives

1. Learn the fundamental principles of Predictive analytics for business.
2. Visualize and explore data to better understand relationships among variables.
3. Examine how predictive analytics can be used in decision-making.
4. Apply predictive models to generate predictions for new data.
5. Apply Time Series analysis for solving real world problems.

Course Outcomes

After completion of the course, students will be able to

1. Understand the importance of predictive analytics.
2. Able to prepare and process data for the models.
3. Learn about statistical analysis techniques used in predictive models.
4. Learnabout important time series models and their applications in variousfields.
5. Formulate real life problems using multivariate time series models and its applications.

Syllabus

UnitI: Introduction and Understanding Data

Introduction to predictive analytics – Business analytics: types, applications- Models: predictive models – descriptive models – decision models - applications - analytical techniques.

Data types and associated techniques – complexities of data – data preparation, pre-processing – exploratory data analysis.

UnitII: Principles and Techniques

Predictive modeling: Propensity models, cluster models, collaborative filtering, applications and limitations - Statistical analysis: Univariate and Multivariate Statistical analysis.

Model Selection - Preparing to model the data: supervised versus unsupervised methods, statistical and data mining methodology, cross-validation, overfitting, bias-variance trade-off, balancing the training dataset, establishing baseline performance.

UnitIII:Regression and Classification Models

Measuring Performance in Regression Models - Linear Regression and Its Cousins - Non-

Linear Regression Models - Regression Trees and Rule-Based Models Case Study: Compressive Strength of Concrete Mixtures.

Measuring Performance in Classification Models - Discriminant Analysis and Other Linear Classification Models - Non-Linear Classification Models - Classification Trees and Rule-Based Models – Model Evaluation Techniques

Unit IV: Time Series Analysis

Unit-IV Time Series Analysis: Introduction , Examples of time series, Stationary models and autocorrelation function, Estimation and elimination of trend and seasonal components, Stationary Process and ARMA Models -- Basic properties and linear processes, Introduction to ARMA models, properties of sample mean and autocorrelation, function, Forecasting stationary time series, ARMA(p, q) processes, ACF and PACF, Modeling and Forecasting with ARMA.

Unit V: Nonstationary and Seasonal Time Series Models- ARIMA models, Identification techniques, Unit roots in time series, Forecasting ARIMA models, Seasonal ARIMA models Regression with ARMA errors.Multivariate Time Series analysis, State-Space Models, Deep Learning techniques of time series forecasting

Text Book(s):

1. Jeffrey Strickland, Predictive analytics using R, Simulation educators, Colorado Springs, 2015.
2. Max Kuhn and Kjell Johnson, Applied Predictive Modeling, 1st edition Springer, 2013.
3. Brockwell, Peter J. and Davis, Richard A. (2002). Introduction to Time Series andForecasting, 2nd edition. Springer-Verlag, New York.

ReferenceBooks:

1. Anasse Bari, Mohamed Chaouchi, Tommy Jung, Predictive analytics for dummies, 2nd edition Wiley, 2016.
2. Dinov, ID., Data Science and Predictive Analytics: Biomedical and Health Applications using R, Springer, 2018.
3. Daniel T.Larose and Chantal D.Larose, Data Mining and Predictive analytics, 2nd edition Wiley, 2015.
4. Data Mining and Predictive Analytics, 2ed (An Indian Adaptation) by Daniel Larose, OP Wali - John Wiley Publication

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New Scheme Based On AICTE Flexible Curricula

Artificial Intelligence & Data Science, VII-Semester

Open Elective-703 (A) Data Visualization

Course Objective:

1. To understand how to accurately represent voluminous complex data set on the web and from other data sources.
2. To understand the methodologies used to visualize large data sets.
3. To understand the various process involved in data visualization.
4. To get used to using interactive data visualization.
5. To understand the different security aspects involved in data visualization.

Course Outcomes

Upon completion of the course, the students will be able to

1. Understand the representation of complex and voluminous data.
2. Design and use various methodologies present in data visualization.
3. Understand the various process and tools used for data visualization.
4. Use interactive data visualization to make inferences.
5. Ability to visualize categorical, quantitative and text data.

Syllabus

Unit I:Introduction to Data Visualization

Overview of data visualization, Definition, Significance in AI and Data Science, Principal of Data Visualization, Methodology, Applications, Data pre-processing for visualization: Extraction, Cleaning, Transformation, Aggregation, Data Integration, Data Reduction.

Unit II: Data Visualization Techniques

Data Visualization Techniques– Pixel-Oriented Visualization Techniques- Geometric Projection Visualization Techniques- Icon-Based Visualization Techniques- Hierarchical Visualization Techniques, Visualizing Complex Data and Relations.

Visualization Techniques, Scalar and point techniques, Color maps, Contouring Height Plots - Vector visualization techniques, Vector properties, Vector Glyphs, Vector Color Coding Stream Objects. Exploratory data analysis (EDA) Techniques

Unit III: Data Visualization Tools

Basic and advanced charts and graphs: bar charts, line charts, scatter plots, histograms, and heat maps. Geospatial visualization: maps, choropleth maps, geospatial heat maps, Network visualization: node-link diagrams, force-directed graphs, Interactive visualization: interactivity and user engagement techniques, Introduction to programming libraries for data visualization: Matplotlib, Seaborn, Plotly.

Introduction to data visualization tools- Tableau, Visualization using R.

Unit IV: Visualizing Multidimensional Data

Multivariate visualization techniques: parallel coordinates, scatter plot matrices, Dimensionality reduction techniques: PCA (Principal Component Analysis), t-SNE (t-Distributed Stochastic Neighbour Embedding), Clustering and classification visualization: dendrograms, decision trees, confusion matrices, Visualizing high-dimensional data: glyph-based visualization, parallel coordinates, dimension stacking.

Unit V:Advancements in Data Visualization

Time- Series data visualization, Big data visualization, Text data visualization Multivariate data visualization. Storytelling with data, Dashboard creation, Ethical considerations in data visualization, Case Studies for Finance-marketing, and insurance healthcare.

REFERENCES:

1. Tamara Munzer, “Visualization Analysis and Design”, CRC Press 2014
2. Alexandru Telea, “Data Visualization Principles and Practice” CRC Press 2014.
3. Data Visualization: Storytelling Using Data by Sharada Sringeswara - John Wiley Publication
4. Fundamentals of Data Visualization: A Primer on Making Informative and Compelling Figures Paperback – 31 March 2019 by Claus O. Wilke (Author), by O’Reilly.
5. Reimagining Data Visualization Using Python by Seema Acharya - John Wiley Publication.

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New Scheme Based On AICTE Flexible Curricula

Artificial Intelligence & Data Science, VII-Semester

Open Elective-703 (B) Mobile Application Development

Course Objectives:

1. To facilitate students to understand Android SDK
2. To help students to gain a basic understanding of Android application development
3. To inculcate working knowledge of Android Studio development tool

Course Outcomes:

After the completion of this course, the students will be able to:

1. Identify various concepts of mobile programming that make it unique from programming for other platforms.
2. Critique mobile applications on their design pros and cons.
3. Utilize rapid prototyping techniques to design and develop sophisticated mobile interfaces.
4. Program mobile applications for the Android operating system that use basic and advanced phone features.
5. Deploy applications to the Android marketplace for distribution.

Syllabus

Unit I: Introduction to Android: The Android Platform, Android SDK, Eclipse Installation, Android Installation, Building you First Android application, Understanding Anatomy of Android Application, Android Manifest file.

Unit II Android Application Design Essentials: Anatomy of an Android applications, Android terminologies, Application Context, Activities, Services, Intents, Receiving and Broadcasting Intents, Android Manifest File and its common settings, Using Intent Filter, Permissions.

Unit III: Android User Interface Design Essentials: User Interface Screen elements, Designing User Interfaces with Layouts, Drawing and Working with Animation.

Unit IV: Testing Android applications, Publishing Android application, Using Android preferences, Managing Application resources in a hierarchy, working with different types of resources.

Unit V: Using Common Android APIs: Using Android Data and Storage APIs, Managing data using SQLite, Sharing Data between Applications with Content Providers, Using Android Networking APIs, Using Android Web APIs, Using Android Telephony APIs, Deploying Android Application to the World.

Recommended Books:

1. Lauren Darcey and Shane Conder, “Android Wireless Application Development”, Addison-Wesley,2009.
2. Reto Meier, “Professional AndroidTM Application Development”, Wiley Publishing,2014.
3. Mark L Murphy, “Beginning Android”, Wiley India Pvt Ltd.,2009.
4. Joseph Annuzzi, Jr, Lauren Darcey and Shane Conder, “Advanced Android™ Application Development”, Fourth Edition, Addison-Wesley,2014.
5. Barry Burd ,“Android Application Development All-in-One For Dummies”, Wiley, 2015.

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New Scheme Based On AICTE Flexible Curricula

Artificial Intelligence & Data Science, VII-Semester

Open Elective-703 (C) Advanced Statistical Analytics

Course Objective:

1. To provide a comprehensive understanding of sampling techniques and sampling distributions.
2. To develop skills in correlation and regression analysis for analyzing relationships between variables.
3. To introduce hypothesis testing and provide knowledge of various tests for means, proportions, and variances.
4. To explore the concept of point estimation and develop an understanding of different estimation methods.
5. To introduce Bayesian statistics and its applications in data analysis.

Course Outcomes:

After completion of this course student will be able to:

1. Understand the concepts of population, sample, and different sampling techniques.
2. Apply various statistical methods to analyze relationships between variables using correlation and regression analysis.
3. Conduct hypothesis tests for means, proportions, variances, and correlation coefficients.
4. Estimate population parameters using different estimation methods and determine the quality of estimators.
5. Apply Bayesian statistics for parameter estimation and understand the concepts of hierarchical modeling and survival analysis in Bayesian inference.

Syllabus

UNIT 1

Introduction: Population and Sample, Random Sampling from finite population (SRSWR and SRSWOR),Parameter and Statistic, Sampling distribution of as tatistic in the context of a finite population, Sampling distribution of sample mean and sample proportion whilesampling from a finite population. Random sampling from an infinite population, Sampling Distribution of sample mean and sample variance when the sample is drawn from a Normal distribution, Problems on sampling distributions of statistics from finite and infinite populations. Statement of Lyndeberg-Levy Central Limit Theorem (CLT) and its applications.

UNIT 2

Correlation, Regression Analysis and ANOVA: Correlation, Scatter diagram, Karl Pearson's coefficient of correlation, Spearman's Rank correlation coefficient, Methods of least square, Simple linear Regression model, SLR assumptions and prediction Multiple linear Regression, MLR assumption and prediction, Polynomial Regression, Logistics Regression, Poisson Regression, Non-Linear Regression Analysis of Variance (One way & Two Way). Analysis of Covariance, Multivariate Analysis of Variance

UNIT 3

Testing of Hypothesis:

Testing of Hypotheses: Null and Alternative Hypothesis, Testing Procedure (Critical region), Type I and Type II errors, Level of significance & Power of atest, p-value for symmetric null distribution. Tests for me an and proportion (single sample, two sample; exact & large sample)

Tests for variance (single sample and two samples), Tests for me an and correlation coefficient for paired sample (Exact & Large sample), Analysis of Variance (one way).

UNIT 4

Parametric Point Estimation: Problem of point estimation, Criteria of a good Estimator, Unbiasedness, Consistency, Efficiency, Sufficiency Minimum Variance and Unbiasedness (Small sample) Method of moments, Method of Maximum Likelihood, Consistency & Efficiency (Large sample), Interval Estimation: Confidence Intervals of mean and proportion in large samples.

UNIT 5

Bayesian Statistics: Introduction to Bayesian inference, Bayesian parameter estimation, Markov Chain Monte Carlo (MCMC) methods, Bayesian hierarchical models, Survival analysis, Causal inference, High-dimensional data analysis.

Text Books:

1. Statistical Methods by SP Gupta : 31st Edition: Sultan Chand and sons
2. Mathematical Statistics by S.C Gupta and VK Kapoor (10th Edition) : Sultan Chand and sons

Reference Books:

1. Understanding and using Advance Statistics by Jeremy Foster Emma Barkus Christian Yavorsay, Sage Publication.
2. Understanding Advanced Statistical Methods (Chapman & Hall/CRC Texts in Statistical Science), by Peter Westfall, Kevin S. S. Henning ,2013

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New Scheme Based On AICTE Flexible Curricula

Artificial Intelligence & Data Science, VII-Semester

Open Elective-703 (D) Social Media & Web Analytics

Course Objective:

1. Understand the use and applications of Social media Analytics.
2. Apply the fundamentals of social and web analytics on various social media platforms.
3. Understand the fundamentals of web metrics & Analysis.
4. Able to perform web 2.0 Analytics.

Course Outcomes:

After the completion of this course, the students will be able to:

1. Understand social media, web and social media analytics, and their potential impact.
2. Learn the usability metrics, web and social media metrics.
3. Identify key performance indicators for a given goal; identify data relating to the metrics and key performance indicators.
4. Perform web analytics on social media platform like- Facebook and Google.
5. Perform qualitative Analysis based on heuristic evaluation.

Syllabus

UnitI: Social Media & Analytics: Introduction to Social Media, Social Media Landscape, Social Media Analytics & its Need. SMA in Small and Large Organisations; Application of SMA in Different Social Media Platforms.

Introduction to Web Analytics: Definition, Process, Key Terms: Site References, Keywords and Key Phrases; Building Block Terms: Visit Characterization Terms, Content Characterization Terms, Conversion Metrics; Categories: Offsite Web, on Site Web; Web Analytics Platform, Web Analytics Evolution, Need of Web Analytics, Advantages & Limitations.

UnitII: Network Fundamentals: The Social Networks Perspective - Nodes, Ties and Influencers, Social Network, Web Data and Methods.

Data Collection and Web Analytics Fundamentals: Capturing Data: Web Logs, Web Beacons, Java Script Tags, Packet Sniffing; Outcome Data: E-commerce, Lead Generation, Brand/ Advocacy and Support; Competitive Data: Panel Based Measurement, ISP Based Measurement, Search Engine Data; Organisational Structure.

Type and Size of Data, Identifying Unique page Definition, Cookies, Link Coding Issues.

Unit III: Web Metrics & Analytics: Common Metrics: Hits, Page Views, Visits, Unique Page Views, Bounce, Bounce Rate & its Improvement, Average Time on Site, Real Time Report, Traffic Source Report, Custom Campaigns, Content Report, Google Analytics; Key-Performance Indicator: Need, Characteristics, Perspective and Uses.

Graphs and Matrices- Basic Measures for Individuals and Networks. Random Graphs & Network Evolution, Social Context: Affiliation & Identity

Web analytics Tools: A/B testing, Online Surveys, Web Crawling and Indexing. Natural Language Processing Techniques for Micro-Text Analysis.

Unit IV: Facebook Analytics: Introduction, Parameters, Demographics. Analyzing Page Audience: Reach and Engagement Analysis. Post-Performance on FB; Social Campaigns: Goals and Evaluating Outcomes, Measuring and Analysing Social Campaigns, Social Network Analysis, AdWords, Benchmarking, Categories of Traffic.
Google Analytics: Brief Introduction and Working, Google Website Optimizer, Implementation Technology, Limitations, Performance Concerns, Privacy Issues.

Unit V: Qualitative Analysis: Heuristic Evaluations: Conducting a Heuristic Evaluation, Benefits of Heuristic Evaluations; Site Visits: Conducting a Site Visit, Benefits of Site Visits; Surveys: Website Surveys, Post-Visit Surveys, Creating and Running a Survey, Benefits of Surveys.
Web analytics 2.0: Web Analytics 1.0 & its Limitations, Introduction to WA 2.0, Competitive Intelligence Analysis and Data Sources; Website Traffic Analysis: Traffic Trends, Site Overlap and Opportunities.

Reference Books:

1. Matthew Ganis, Avinash Kohirkar, Social Media Analytics: Techniques and Insights for Extracting Business Value Out of Social Media Pearson 2016
2. Jim Sterne, Social Media Metrics: How to Measure and Optimize Your Marketing Investment Wiley Latest edition
3. Brian Clifton, Advanced Web Metrics with Google Analytics, John Wiley & Sons; 3rd Edition edition (30 Mar 2012)
4. Ganis/Kohirka, SOCIAL MEDIA ANALYTICS Paperback – 29 September 2016 by Pearson.