

INTERNATIONAL JOURNAL OF RESEARCH IN COMPUTER APPLICATION & MANAGEMENT

IJRCM



A Monthly Double-Blind Peer Reviewed Refereed Open Access International e-Journal - Included in the International Serial Directories

Indexed & Listed at:

Ulrich's Periodicals Directory ©, ProQuest, U.S.A., EBSCO Publishing, U.S.A., Cabell's Directories of Publishing Opportunities, U.S.A.

as well as in Open J-Gate, India [link of the same is duly available at infibnet of University Grants Commission (U.G.C.)]

Registered & Listed at: Index Copernicus Publishers Panel, Poland

Circulated all over the world & Google has verified that scholars of more than Hundred & Thirty Two countries/territories are visiting our journal on regular basis.

Ground Floor, Building No. 1041-C-1, Devi Bhawan Bazar, JAGADHRI – 135 003, Yamunanagar, Haryana, INDIA

www.ijrcm.org.in

CONTENTS

Sr. No.	TITLE & NAME OF THE AUTHOR (S)	Page No.
1.	INTERNATIONAL STUDENT COLLABORATION AND EXPERIENTIAL EXERCISE PROJECTS AS A PROFESSIONAL, INTER-PERSONAL AND INTER-INSTITUTIONAL NETWORKING PLATFORM <i>JOSE G. VARGAS-HERNANDEZ, DR. ADRIAN DE LEON-ARIAS, DR. ANDRES VALDES-ZEPEDA & DR. VICTOR MANUEL CASTILLO-GIRON</i>	1
2.	AN EMPIRICAL STUDY ON MARKETING OF GADWAL SARIS IN INDIA <i>DR. K.V. ACHALAPATHI, PREETI SHRIVASTAVA & SHAILAJA BANGARI</i>	10
3.	IDENTIFYING THE FACTORS EFFECTIVE ON ORGANIZATIONAL INNOVATION IN SERVICES <i>MOSTAFA ALIMIRI, MOHAMMAD HASSAN MOBARAKI & FATEMEH MOHEBBI FAR</i>	17
4.	THE EFFECT OF INDIVIDUALITY AND POWER DISTANCE ON INCOME SMOOTHING <i>SEYED HOSSEIN HOSSEINI & MOHAMADREZA ABDOLI</i>	22
5.	MANAGEMENT OF ELECTRICITY POWER SUPPLY IN DELTA AND EDO STATES OF NIGERIA: PROBLEMS AND PROSPECTS <i>ANTHONY A. IJEWERE</i>	26
6.	EMOTIONAL INTELLIGENCE AND ITS IMPACT ON TASK PERFORMANCE AND CONTEXTUAL PERFORMANCE <i>U.W.M.R. SAMPATH KAPPAGODA</i>	32
7.	THE RELATIONS BETWEEN CASH MANAGEMENT POLICIES AND PROFITABILITY OF SMEs IN KANO <i>DR. MUHAMMAD AMINU ISA</i>	37
8.	ACCELERATED LEARNING SOLUTIONS (ALS) – A MODEL FOR LEARNING ON THE JOB & PRODUCTIVITY ENHANCEMENT OF FRESH ENGINEERING GRADUATES THROUGH TITP (TELECOM INDUSTRY TRAINING AND PLACEMENT) <i>SREENIVASAN RAM, SUDHIR WARIER & LRK KRISHNAN</i>	40
9.	RURAL E-BANKING: A TECHNICAL FRAMEWORK USING MOBILE TERMINALS <i>DR. V. B. AGGARWAL, DEEPTI SHARMA & ARCHANA B. SAXENA</i>	47
10.	BIOMETRIC SECURITY IN MOBILE BANKING <i>S. T. BHOSALE & DR. B. S. SAWANT</i>	52
11.	SPIRITUAL INTELLIGENCE – A CHANGE MANAGEMENT STUDY <i>MADHUSUDAN.V & DR. NAGALINGAPPA.G</i>	56
12.	INTEGRATED RELIABILITY MODEL AND FAILURE MODES EFFECTS & CRITICALITY ANALYSIS FOR OPTIMUM RELIABILITY <i>K. S. LAKSHMINARAYANA & Y. VIJAYA KUMAR</i>	59
13.	FACTOR ANALYSIS OF DEFECTS IN SOFTWARE ENGINEERING <i>DR. SEETHARAM.K, LAXMI B RANANAVARE & CHANDRAKANTH G PUJARI</i>	65
14.	CONCERNS FOR SECURITY IN MIGRATING TO CLOUD COMPUTING <i>NITASHA HASTEER, DR. ABHAY BANSAL & TANYA SHARMA</i>	67
15.	PREDOMINANCE OF TRADITIONAL SECTOR IN UNORGANISED MANUFACTURING OF INDIA <i>DR. NEERU GARG</i>	70
16.	THE INSIGHT VIEW OF QUALITY OF WORK LIFE: A STUDY ON THE EMPLOYEES OF PUBLIC SECTOR AND PRIVATE SECTOR BANKS IN TIRUNELVELI DISTRICT <i>A. MADHU, T. RITA REBEKAH & DR. R. MOHAN KUMAR</i>	73
17.	DATA MINING FOR MOVING OBJECT DATA <i>VOORE SUBBA RAO & DR. VINAY CHAVAN</i>	78
18.	ECONOMIC TOURISM MANAGEMENT: AN APPLIED S.H.G. MODELING THROUGH CASE ANALYSIS OF ELLORA CAVES & DAULATABAD FORT – AN INDIAN APPROACH <i>DR. S. P. RATH, DR. BISWAJIT DAS, SATISH JAYARAM & MEENA SINHA</i>	81
19.	IMAGE RETRIEVAL USING CONTENT OF IMAGE <i>PREETI MISHRA & AVINASH DHOLE</i>	87
20.	FACTORS INFLUENCING COMPANY VALUATION: AN EMPIRICAL ASSESSMENT OF THE INDIAN CORPORATE SECTOR <i>DR. KAUSHIK CHAKRABORTY & NILANJAN RAY</i>	90
21.	CHRONOLOGICAL STUDY ON POSITIONING WITH EMPHASIS ON MALLS <i>SURESH SANNAPU & NRIPENDRA SINGH</i>	94
22.	CYBER ATTACK MODELING AND REPLICATION FOR NETWORK SECURITY <i>B.VENKATACHALAM & S. CHRISTY</i>	98
23.	WORKING CAPITAL MANAGEMENT OF HUL – A CASE STUDY <i>SOMNATH DAS</i>	102
24.	A STRATEGIC FRAMEWORK TOWARDS INDIAN RURAL RETAIL INDUSTRY IN THIS COMPETITIVE ERA <i>URVASHI GUPTA</i>	107
25.	EVALUATION OF THE PERFORMANCE OF TRAINING PROGRAM AT CARBORUNDUM UNIVESAL LIMITED, RANIPET <i>R. GEETHA & DR. A. DUNSTAN RAJKUMAR</i>	112
26.	QUALITY DATA REPRESENTATION IN WEB PORTAL – A CASE STUDY <i>S. CHRISTY, S. BRINTHA RAJAKUMARI & DR. M. SURYAKALA</i>	117
27.	PERFORMANCE ANALYSIS OF FIRE ALARM SYSTEM BASED ON WIRELESS SENSOR NETWORKS USING NS-2 <i>B. RAJESH, D. UPENDER & K. SRINIVAS</i>	120
28.	COMPARISON AND ANALYSIS OF WIRELESS NETWORKS FOR HEALTH CARE TELEMONITORING SYSTEM <i>KANTA JANGRA & KAVITA DUA</i>	125
29.	ECO-FRIENDLY MARKETING AND CONSUMER BUYING BEHAVIOR: AN EMPIRICAL STUDY <i>ADIL ZIA</i>	131
30.	A PROPOSED FRAMEWORK FOR AUTO REGULATED MIGRATING PARALLEL CRAWLER <i>VISHAL, SUBHASH CHANDER & NEELAM</i>	136
	REQUEST FOR FEEDBACK	140

CHIEF PATRON

PROF. K. K. AGGARWAL

Chancellor, Lingaya's University, Delhi
Founder Vice-Chancellor, Guru Gobind Singh Indraprastha University, Delhi
Ex. Pro Vice-Chancellor, Guru Jambheshwar University, Hisar

PATRON

SH. RAM BHAJAN AGGARWAL

Ex. State Minister for Home & Tourism, Government of Haryana
Vice-President, Dadri Education Society, Charkhi Dadri
President, Chinar Syntex Ltd. (Textile Mills), Bhiwani

CO-ORDINATOR

MOHITA

Faculty, Yamuna Institute of Engineering & Technology, Village Gadholi, P. O. Gadholi, Yamunanagar

ADVISORS

DR. PRIYA RANJAN TRIVEDI

Chancellor, The Global Open University, Nagaland

PROF. M. S. SENAM RAJU

Director A. C. D., School of Management Studies, I.G.N.O.U., New Delhi

PROF. S. L. MAHANDRU

Principal (Retd.), Maharaja Agrasen College, Jagadhri

EDITOR

PROF. R. K. SHARMA

Professor, Bharti Vidyapeeth University Institute of Management & Research, New Delhi

CO-EDITOR

MOHITA

Faculty, Yamuna Institute of Engineering & Technology, Village Gadholi, P. O. Gadholi, Yamunanagar

EDITORIAL ADVISORY BOARD

DR. RAJESH MODI

Faculty, Yanbu Industrial College, Kingdom of Saudi Arabia

PROF. PARVEEN KUMAR

Director, M.C.A., Meerut Institute of Engineering & Technology, Meerut, U. P.

PROF. H. R. SHARMA

Director, Chhatrapati Shivaji Institute of Technology, Durg, C.G.

PROF. MANOHAR LAL

Director & Chairman, School of Information & Computer Sciences, I.G.N.O.U., New Delhi

PROF. ANIL K. SAINI

Chairperson (CRC), Guru Gobind Singh I. P. University, Delhi

PROF. R. K. CHOUDHARY

Director, Asia Pacific Institute of Information Technology, Panipat

DR. ASHWANI KUSH

Head, Computer Science, University College, Kurukshetra University, Kurukshetra

DR. BHARAT BHUSHAN

Head, Department of Computer Science & Applications, Guru Nanak Khalsa College, Yamunanagar

DR. VIJAYPAL SINGH DHAKA

Dean (Academics), Rajasthan Institute of Engineering & Technology, Jaipur

DR. SAMBHAVNA

Faculty, I.I.T.M., Delhi

DR. MOHINDER CHAND

Associate Professor, Kurukshetra University, Kurukshetra

DR. MOHENDER KUMAR GUPTA

Associate Professor, P. J. L. N. Government College, Faridabad

DR. SAMBHAV GARG

Faculty, M. M. Institute of Management, Maharishi Markandeshwar University, Mullana

DR. SHIVAKUMAR DEENE

Asst. Professor, Dept. of Commerce, School of Business Studies, Central University of Karnataka, Gulbarga

DR. BHAVET

Faculty, M. M. Institute of Management, Maharishi Markandeshwar University, Mullana

ASSOCIATE EDITORS**PROF. ABHAY BANSAL**

Head, Department of Information Technology, Amity School of Engineering & Technology, Amity University, Noida

PROF. NAWAB ALI KHAN

Department of Commerce, Aligarh Muslim University, Aligarh, U.P.

DR. ASHOK KUMAR

Head, Department of Electronics, D. A. V. College (Lahore), Ambala City

ASHISH CHOPRA

Sr. Lecturer, Doon Valley Institute of Engineering & Technology, Karnal

SAKET BHARDWAJ

Lecturer, Haryana Engineering College, Jagadhri

TECHNICAL ADVISORS**AMITA**

Faculty, Government M. S., Mohali

MOHITA

Faculty, Yamuna Institute of Engineering & Technology, Village Gadholi, P. O. Gadholi, Yamunanagar

FINANCIAL ADVISORS**DICKIN GOYAL**

Advocate & Tax Adviser, Panchkula

NEENA

Investment Consultant, Chambaghat, Solan, Himachal Pradesh

LEGAL ADVISORS**JITENDER S. CHAHAL**

Advocate, Punjab & Haryana High Court, Chandigarh U.T.

CHANDER BHUSHAN SHARMA

Advocate & Consultant, District Courts, Yamunanagar at Jagadhri

SUPERINTENDENT**SURENDER KUMAR POONIA**

CALL FOR MANUSCRIPTS

We invite unpublished novel, original, empirical and high quality research work pertaining to recent developments & practices in the area of Computer, Business, Finance, Marketing, Human Resource Management, General Management, Banking, Insurance, Corporate Governance and emerging paradigms in allied subjects like Accounting Education; Accounting Information Systems; Accounting Theory & Practice; Auditing; Behavioral Accounting; Behavioral Economics; Corporate Finance; Cost Accounting; Econometrics; Economic Development; Economic History; Financial Institutions & Markets; Financial Services; Fiscal Policy; Government & Non Profit Accounting; Industrial Organization; International Economics & Trade; International Finance; Macro Economics; Micro Economics; Monetary Policy; Portfolio & Security Analysis; Public Policy Economics; Real Estate; Regional Economics; Tax Accounting; Advertising & Promotion Management; Business Education; Management Information Systems (MIS); Business Law, Public Responsibility & Ethics; Communication; Direct Marketing; E-Commerce; Global Business; Health Care Administration; Labor Relations & Human Resource Management; Marketing Research; Marketing Theory & Applications; Non-Profit Organizations; Office Administration/Management; Operations Research/Statistics; Organizational Behavior & Theory; Organizational Development; Production/Operations; Public Administration; Purchasing/Materials Management; Retailing; Sales/Selling; Services; Small Business Entrepreneurship; Strategic Management Policy; Technology/Innovation; Tourism, Hospitality & Leisure; Transportation/Physical Distribution; Algorithms; Artificial Intelligence; Compilers & Translation; Computer Aided Design (CAD); Computer Aided Manufacturing; Computer Graphics; Computer Organization & Architecture; Database Structures & Systems; Digital Logic; Discrete Structures; Internet; Management Information Systems; Modeling & Simulation; Multimedia; Neural Systems/Neural Networks; Numerical Analysis/Scientific Computing; Object Oriented Programming; Operating Systems; Programming Languages; Robotics; Symbolic & Formal Logic and Web Design. The above mentioned tracks are only indicative, and not exhaustive.

Anybody can submit the soft copy of his/her manuscript **anytime** in M.S. Word format after preparing the same as per our submission guidelines duly available on our website under the heading guidelines for submission, at the email addresses: infoijrcm@gmail.com or info@ijrcm.org.in.

GUIDELINES FOR SUBMISSION OF MANUSCRIPT

1. **COVERING LETTER FOR SUBMISSION:**

DATED: _____

THE EDITOR
IJRCM

Subject: SUBMISSION OF MANUSCRIPT IN THE AREA OF _____.

(e.g. Finance/Marketing/HRM/General Management/Economics/Psychology/Law/Computer/IT/Engineering/Mathematics/other, please specify)

DEAR SIR/MADAM

Please find my submission of manuscript entitled ' _____ ' for possible publication in your journals.

I hereby affirm that the contents of this manuscript are original. Furthermore, it has neither been published elsewhere in any language fully or partly, nor is it under review for publication elsewhere.

I affirm that all the author (s) have seen and agreed to the submitted version of the manuscript and their inclusion of name (s) as co-author (s).

Also, if my/our manuscript is accepted, I/We agree to comply with the formalities as given on the website of the journal & you are free to publish our contribution in any of your journals.

NAME OF CORRESPONDING AUTHOR:

Designation:

Affiliation with full address, contact numbers & Pin Code:

Residential address with Pin Code:

Mobile Number (s):

Landline Number (s):

E-mail Address:

Alternate E-mail Address:

NOTES:

- a) The whole manuscript is required to be in **ONE MS WORD FILE** only (pdf. version is liable to be rejected without any consideration), which will start from the covering letter, inside the manuscript.
- b) The sender is required to mention the following in the **SUBJECT COLUMN** of the mail:
New Manuscript for Review in the area of (Finance/Marketing/HRM/General Management/Economics/Psychology/Law/Computer/IT/Engineering/Mathematics/other, please specify)
- c) There is no need to give any text in the body of mail, except the cases where the author wishes to give any specific message w.r.t. to the manuscript.
- d) The total size of the file containing the manuscript is required to be below **500 KB**.
- e) Abstract alone will not be considered for review, and the author is required to submit the complete manuscript in the first instance.
- f) The journal gives acknowledgement w.r.t. the receipt of every email and in case of non-receipt of acknowledgment from the journal, w.r.t. the submission of manuscript, within two days of submission, the corresponding author is required to demand for the same by sending separate mail to the journal.

2. **MANUSCRIPT TITLE:** The title of the paper should be in a 12 point Calibri Font. It should be bold typed, centered and fully capitalised.

3. **AUTHOR NAME (S) & AFFILIATIONS:** The author (s) **full name, designation, affiliation (s), address, mobile/landline numbers, and email/alternate email address** should be in italic & 11-point Calibri Font. It must be centered underneath the title.

4. **ABSTRACT:** Abstract should be in fully italicized text, not exceeding 250 words. The abstract must be informative and explain the background, aims, methods, results & conclusion in a single para. Abbreviations must be mentioned in full.

5. **KEYWORDS:** Abstract must be followed by a list of keywords, subject to the maximum of five. These should be arranged in alphabetic order separated by commas and full stops at the end.
6. **MANUSCRIPT:** Manuscript must be in **BRITISH ENGLISH** prepared on a standard A4 size **PORTRAIT SETTING PAPER**. It must be prepared on a single space and single column with 1" margin set for top, bottom, left and right. It should be typed in 8 point Calibri Font with page numbers at the bottom and centre of every page. It should be free from grammatical, spelling and punctuation errors and must be thoroughly edited.
7. **HEADINGS:** All the headings should be in a 10 point Calibri Font. These must be bold-faced, aligned left and fully capitalised. Leave a blank line before each heading.
8. **SUB-HEADINGS:** All the sub-headings should be in a 8 point Calibri Font. These must be bold-faced, aligned left and fully capitalised.
9. **MAIN TEXT:** The main text should follow the following sequence:

INTRODUCTION

REVIEW OF LITERATURE

NEED/IMPORTANCE OF THE STUDY

STATEMENT OF THE PROBLEM

OBJECTIVES

HYPOTHESES

RESEARCH METHODOLOGY

RESULTS & DISCUSSION

FINDINGS

RECOMMENDATIONS/SUGGESTIONS

CONCLUSIONS

SCOPE FOR FURTHER RESEARCH

ACKNOWLEDGMENTS

REFERENCES

APPENDIX/ANNEXURE

It should be in a 8 point Calibri Font, single spaced and justified. The manuscript should preferably not exceed **5000 WORDS**.

10. **FIGURES & TABLES:** These should be simple, crystal clear, centered, separately numbered & self explained, and **titles must be above the table/figure**. **Sources of data should be mentioned below the table/figure**. It should be ensured that the tables/figures are referred to from the main text.
11. **EQUATIONS:** These should be consecutively numbered in parentheses, horizontally centered with equation number placed at the right.
12. **REFERENCES:** The list of all references should be alphabetically arranged. The author (s) should mention only the actually utilised references in the preparation of manuscript and they are supposed to follow **Harvard Style of Referencing**. The author (s) are supposed to follow the references as per the following:
 - All works cited in the text (including sources for tables and figures) should be listed alphabetically.
 - Use **(ed.)** for one editor, and **(ed.s)** for multiple editors.
 - When listing two or more works by one author, use --- (20xx), such as after Kohl (1997), use --- (2001), etc, in chronologically ascending order.
 - Indicate (opening and closing) page numbers for articles in journals and for chapters in books.
 - The title of books and journals should be in italics. Double quotation marks are used for titles of journal articles, book chapters, dissertations, reports, working papers, unpublished material, etc.
 - For titles in a language other than English, provide an English translation in parentheses.
 - The location of endnotes within the text should be indicated by superscript numbers.

PLEASE USE THE FOLLOWING FOR STYLE AND PUNCTUATION IN REFERENCES:

BOOKS

- Bowersox, Donald J., Closs, David J., (1996), "Logistical Management." Tata McGraw, Hill, New Delhi.
- Hunker, H.L. and A.J. Wright (1963), "Factors of Industrial Location in Ohio" Ohio State University, Nigeria.

CONTRIBUTIONS TO BOOKS

- Sharma T., Kwatra, G. (2008) Effectiveness of Social Advertising: A Study of Selected Campaigns, Corporate Social Responsibility, Edited by David Crowther & Nicholas Capaldi, Ashgate Research Companion to Corporate Social Responsibility, Chapter 15, pp 287-303.

JOURNAL AND OTHER ARTICLES

- Schemenner, R.W., Huber, J.C. and Cook, R.L. (1987), "Geographic Differences and the Location of New Manufacturing Facilities," Journal of Urban Economics, Vol. 21, No. 1, pp. 83-104.

CONFERENCE PAPERS

- Garg, Sambhav (2011): "Business Ethics" Paper presented at the Annual International Conference for the All India Management Association, New Delhi, India, 19–22 June.

UNPUBLISHED DISSERTATIONS AND THESES

- Kumar S. (2011): "Customer Value: A Comparative Study of Rural and Urban Customers," Thesis, Kurukshetra University, Kurukshetra.

ONLINE RESOURCES

- Always indicate the date that the source was accessed, as online resources are frequently updated or removed.

WEBSITE

- Garg, Bhavet (2011): Towards a New Natural Gas Policy, Political Weekly, Viewed on January 01, 2012 <http://epw.in/user/viewabstract.jsp>

DATA MINING FOR MOVING OBJECT DATA

VOORE SUBBA RAO
M. TECH. (CSE) STUDENT
JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY
HYDERABAD

DR. VINAY CHAVAN
HEAD
DEPARTMENT OF COMPUTER SCIENCE & IT
S. K. PORWAL COLLEGE
KAMPTEE

ABSTRACT

It is easy to observe that the number of moving objects in moving objects databases like those used in transportation systems, or air traffic control centers may be very large. To achieve an acceptable level of performance with such large volumes of continuously changing data, in answering moving object queries, it is not desirable to examine the location of each moving object in the database. Indexing the location attribute is hence necessary. The widely used mechanisms for indexing spatial data, like R Trees, MVB Trees, and Quad Trees etc would not serve the purpose well since the data in spatio-temporal applications have to be continuously updated. Movement of a point object represents the trajectory of the moving point object. Data is typically treated as a set of line segments that collectively describe the trajectory of a moving object in the database. One simplifying approach suggested in [1] is to consider indexing structures to be append-only with respect to time. This means, data grows mainly in the temporal dimension.

KEYWORDS

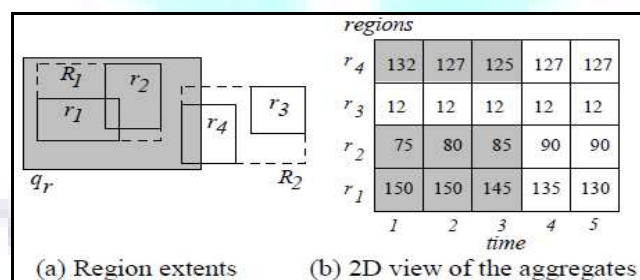
data mining, moving object data.

THE FM ALGORITHM AND COUNTING SKETCH

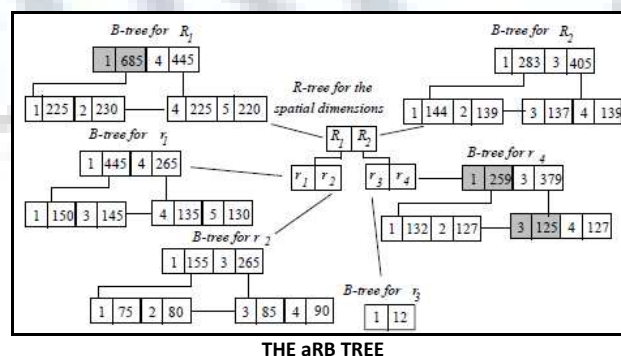
Estimating the number of distinct objects in a dataset has received considerable attention. Many methods in the literature are based on the FM algorithm developed by Flajolet and Martin [FM85]. FM requires a hash function h which takes as input an object id o , and outputs a pseudorandom integer $h(o)$ with a geometric distribution, that is, $\text{Prob}[h(o)=v] = 2^{-v}$ for $v \geq 1$. A sketch consists of r bits, whose initial values are set to 0. For every object o in the dataset, FM sets the $h(o)$ -th bit (of the sketch) to 1. After processing all objects, FM finds the first bit of the sketch that is still 0.

THE aRB TREE

The aRB-tree facilitates aggregate processing by eliminating the need to descend nodes that are totally enclosed by the query. As an example, consider the query in Figure (with interval $qt=[1,3]$). Search starts from the root of the R-tree. Entry R_1 is totally contained inside the query window and the corresponding B-tree is retrieved. Since the entries of the root node in this B-tree contain the aggregate data of interval $[1,3]$ (and $[4,5]$), the next level of the B-tree does not need to be accessed and the contribution of R_1 (i.e., the contribution of r_1, r_2) to the query result is 685. The second root entry R_2 of the R-tree partially overlaps the query rectangle qr ; hence, the algorithm visits its child node, where only entry r_4 intersects qr , and thus its B-tree is retrieved. The first root entry suggests that the contribution of r_4 for interval $[1,2]$ is 259. In order to complete the result, we have to descend the second entry and retrieve the aggregate value of r_4 for timestamp 3 (i.e., 125). The total number of objects in these regions during the interval $[1,3]$ is the sum $685+259+125$. Nevertheless, the aRB-tree does not take into account multiple object occurrences. Therefore, aRB-trees are not directly applicable for applications that require distinct counting.

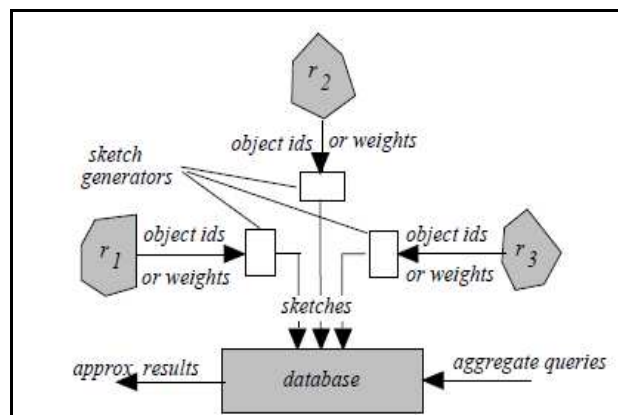


REGIONS AND THEIR AGGREGATE DATA



DISTINCT SPATIO – TEMPORAL AGGREGATION IMPLEMENTATION (SKETCH INDEXING STRUCTURE)

Using the FM algorithm discussed in Section 2, for each region r_i ($1 \leq i \leq m$) and timestamp t we maintain a sketch $s_i(t)$ that captures the (ids of) objects in r_i at t . Figure 3.1 presents the system for distinct aggregation. At each timestamp, every object reports its id (or measure, for DS queries) to the region that covers its location. The region has a *sketch generator* that creates the corresponding sketches based on the object information, and transmits them to the database.

**SYSTEM ARCHITECTURE**

The sketches received by the database can be stored in a two dimensional array shown in Figure.

regions	r_4	10000	11000	10000	10100	10100
	r_3	01000	10000	10000	10000	11111
	r_2	10100	10000	10000	11000	10001
	r_1	10000	01100	01100	11100	10100
		1	2	3	4	5 time

CONCEPTUAL SKETCH STORAGE MODEL**MINING SPATIO – TEMPORAL ASSOCIATION RULES**

Consider a user in region r_i at time t . What is the probability p that this user will appear in region r_j by time $t+T$? We denote such a spatio-temporal association rule with the syntax $(r_i, T, p) \Rightarrow r_j$. Inferring such rules is important in practice. For example, in mobile computing, they can identify trends in user movements and lead to better allocation of antenna bandwidth to cater for potential network congestions in the near future. Additional constraints, such that r_i and r_j must be within certain distance, may also be specified. Then, the number of objects that appear in r_i at time t and then appear in r_j during $[t+1, t+T]$ equals $n_1 + n_2 - n_3$. This idea naturally leads to a simple brute-force algorithm for discovering the association rules, checks all possible instances of (r_i, r_j, t) .

```

algorithm associate_rule_mining ( $T, p, c$ )
/*  $T$  is the horizon;  $p$  is the appearance probability;  $c$  is the
confidence factor */
1. for each region  $r_i$ 
2.   for each region  $r_j$ 
3.     sample=0; witness=0
4.     for each timestamp  $t$  in history
5.       sample++
6.        $s' = s_j(t+1) \text{ OR } s_j(t+2) \text{ OR } \dots \text{ OR } s_j(t+T)$ 
7.        $n_1$ =FM estimate from  $s_i(t)$ ;  $n_2$ =FM estimate from  $s'$ ;
        $n_3$ =estimate from  $s_i(t) \text{ OR } s'$ 
8.       if  $(n_1 + n_2 - n_3) / n_1 > p$  then witness++
9.       if  $(\text{witness} / \text{sample}) > c$  then output rule  $(r_i, T, p) \Rightarrow r_j$ 
end associate_rule_mining
  
```

OBJECTIVES AND CONTRIBUTIONS

As described in the previous section, spatial indexing structures do not serve the purpose well enough when they have to deal with spatio-temporal data. Spatio-temporal indexing structures described in the previous section are mechanisms that are designed to deal with continuously changing data points. Another class of spatio temporal indexing structures are designed to deal with moving object data that changes only discretely. Such data can be indexed efficiently by simply coalescing indexing structures like R Trees, Quad Trees etc with those useable for versioning data, like B Trees and B+ Trees. Examples of such indexing structures include MVB Tree. These indexing structures are easy to implement, manage and have their own class of applications. One such application under study as part of this project work is aggregation querying on moving objects data.

AGGREGATION QUERIES

Given a region (a bounding box), a spatial aggregation query is expected to retrieve aggregated data about all moving objects in the specified region. For some applications of moving object databases, this class of queries is very important. Traffic data analysis is one important example. As a motivating example, consider the query "find the road segments with the heaviest traffic near the centre" or, given a medical emergency, "which is the hospital that can be reached fastest, given the current traffic situation" [aR Tree ref].

In both cases, we are interested only in the number of cars and not the specific details. Now, if the positions of the cars and line segments representing roads are indexed in two different R Trees, the join could be time-consuming. Answering a query such as "give me the traffic for every road segment in an area of 1km radius around each hospital" would require a spatial join between the indexing structures. Such a join is inherently costly.

Also, analytical/aggregation queries in the spatio-temporal context are different from those involving non-spatial attributes in the sense that there is very little a-priori knowledge about the grouping hierarchy. In addition to some predefined regions, a user may request groupings from an arbitrary grid in a selected window.

INDEXING FOR AGGREGATION QUERIES

Aggregation R Tree[ref] is an example of an indexing structure that is designed to index spatial aggregate data. This structure however does not deal too well with temporal attributes of data points. In fact, it uses mechanisms like individual incremental updates (IIU) and batch incremental updates (BIU) to make moving object updates more efficient. A 'temporal lifting' of such a structure is to add versioning support using B trees that represent versions. A similar yet more advanced structure for spatio-temporal aggregation queries has been proposed, called the aRB Tree[ref]. The aRB or the aggregate R- B- Tree uses 'sketches' to represent moving object data in an R Tree. The details of the aRB Tree have already been dealt with in the previous section.

IMPLEMENTING THE aRB TREE

As described in the previous sections, the aRB Tree uses the R- and B- Trees to maintain spatial and temporal aggregation data respectively. We attempt to implement this structure and design algorithms for answering a decent range of aggregation queries.

It is shown in the following sections that, user queries that ask for aggregations from arbitrary groupings can efficiently answered using the indexing structure. The implementation also aims at eliminating certain inherent drawbacks of using R Trees in this indexing structure. Also, for range queries involving time, we suggest the use of B+ Trees instead of B Trees.

Also, the indexing structure introduces the concept of sketches for representing moving objects data. This idea is actually very interesting and useful in applications that look for frequent moving patterns. For example, a query that asks for the region at time 't' with the maximum population density can be easily answered using algorithms on the aRB Tree that deal just with the sketch bit strings. The same is the case with a query that asks for say, 'What is the percentage population in-flow for Electronics City during the time interval (t1, t2)?' Algorithms to a host of similar queries will be described and demonstrated in the sections to follow.

IMPLEMENTATION OF QUERYING FEATURES USING aRB TREE

This section introduces various querying features implemented by the team as part of this project. The detailed algorithms will follow in the next chapter of the report.

The simplest aggregation query in this data structure would be to ask for the total number of objects in a given bounding box/area during a given time interval (t1, t2). This would simply involve operations like 'OR'ing of and counting the number of 1's in a given bit string, similar to the algorithm explained in the previous section. The more complex queries could involve asking for the time of day when a given bounding box observed its maximum population density. This query is equivalent to asking a moving object database, "When during the day, did Electronics City's population peak?"

The advantage of using aRB trees with sketches lies in the fact that it houses enough granularity to answer queries like "When did the bus with Route Number 111 enter R T Nagar?", despite the fact that aRB Tree is a structure designed to support aggregation queries. Another interesting query could ask for "List all fighter planes that passed through area - Id BG235".

CONCLUSION

The proposed aRB Tree is implemented using the C language and various querying features are demonstrated as discussed in the previous sections.

The structure despite being designed keeping aggregations in mind, serves really well for queries requiring higher granularities. We discover a few drawbacks of the structure proposed in [ref] and suggest implementation mechanisms to overcome them. Also, as mentioned the section 2, structures like R*- trees and B+ Trees would be better options for implementing the structure. Spatio-temporal pattern mining is also a much more simplified task using sketches in aRB Trees.

REFERENCES

- [1] Markus Schneider Ralf HartmutGting. Moving objects databases. Morgan Kaufmann Publishers, 2005
- [2] Dieter Pfoser, Christian S. Jensen, and YannisTheodoridis. Novel approaches in query processing for moving object trajectories. In VLDB '00: Proceedings of the 26th International Conference on Very Large Data Bases, pages 395{406, San Francisco, CA, USA, 2000. Morgan Kaufmann Publishers Inc.
- [3] SimonasSaltenis, Christian S. Jensen, Scott T. Leutenegger, and Mario A. Lopez.Indexing the positions of continuously moving objects. In SIGMOD '00: Proceedings of the 2000 ACM SIGMOD international conference on Management of data, pages 331{342, New York, NY, USA, 2000.ACM.
- [4] <http://www.postgresql.org/docs/8.4/static/gist.html>
- [5] Spatio-Temporal Aggregation Using Sketches Yufei Tao, George Kollios, Jeffrey Considine, Feifei Li, Dimitris Papadias
- [6] D. Papadias, P. Kalnis, J. Zhang, and Y. Tao. Efficient OLAP Operations in Spatial Data warehouses

REQUEST FOR FEEDBACK

Dear Readers

At the very outset, International Journal of Research in Computer Application and Management (IJRCM) acknowledges & appreciates your efforts in showing interest in our present issue under your kind perusal.

I would like to request you to supply your critical comments and suggestions about the material published in this issue as well as on the journal as a whole, on our E-mails i.e. **infoijrcm@gmail.com** or **info@ijrcm.org.in** for further improvements in the interest of research.

If you have any queries please feel free to contact us on our E-mail infoijrcm@gmail.com.

I am sure that your feedback and deliberations would make future issues better – a result of our joint effort.

Looking forward an appropriate consideration.

With sincere regards

Thanking you profoundly

Academically yours

Sd/-

Co-ordinator

ABOUT THE JOURNAL

In this age of Commerce, Economics, Computer, I.T. & Management and cut throat competition, a group of intellectuals felt the need to have some platform, where young and budding managers and academicians could express their views and discuss the problems among their peers. This journal was conceived with this noble intention in view. This journal has been introduced to give an opportunity for expressing refined and innovative ideas in this field. It is our humble endeavour to provide a springboard to the upcoming specialists and give a chance to know about the latest in the sphere of research and knowledge. We have taken a small step and we hope that with the active co-operation of like-minded scholars, we shall be able to serve the society with our humble efforts.

Our Other Journals

