

# RESUME OF ARINDAM PAL

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| <b>Summary</b>    | Arindam Pal is a Senior Research Scientist at Data61 in Commonwealth Scientific and Industrial Research Organisation (CSIRO). He is also a Conjoint Senior Lecturer in the School of Computer Science and Engineering at UNSW Sydney. He earned his PhD in Computer Science and Engineering from IIT Delhi. He has over 14 years of industrial research experience in companies like Microsoft, Yahoo!, Novell, CSIRO, Cognizant, and TCS Research. He has over 10 years of experience in Data Science, Optimization, and Machine Learning. He has managed and delivered high-quality software and impactful projects in Australia, US, and India. He is a leader in the area of advanced data science and machine learning.                                                                                                                                                                                                                                                                                          |
| <b>Highlights</b> | <ul style="list-style-type: none"><li>• He has h-index of 18, i10-index of 35, with more than 911 citations.</li><li>• His paper have been published in <b>top conferences and journals</b> – ACM SIGIR Conference on Research and Development in Information Retrieval, ACM Conference on Information and Knowledge Management, ACM/IEEE Joint Conference on Digital Libraries, IEEE International Conference on Robotics and Automation, and Journal of Combinatorial Optimization.</li><li>• <b>He has obtained more than \$1.2 million AUD research grants from different agencies in Australia and Canada.</b></li><li>• He has jointly supervised 2 PhD students and more than 10 Bachelors and Masters students.</li><li>• He has given more than 30 invited talks in Australia, India, United States, and Italy.</li><li>• <b>He has been granted 4 US patents, and has filed 15 patents in United States, European Union, and India.</b></li><li>• He is a Senior Member of both ACM and IEEE.</li></ul>     |
| <b>Expertise</b>  | Artificial Intelligence, Cyber Security, Data Science, Machine Learning, Optimization.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| <b>Skill Set</b>  | C, C++, C#, Java, Python, R, MATLAB, Linux, Windows.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| <b>Education</b>  | <p>INDIAN INSTITUTE OF TECHNOLOGY <span style="float: right;">DELHI, INDIA</span><br/>Ph.D., Computer Science and Engineering, 2007 – 2012.<br/>CGPA: 9.2 on a scale of 10.<br/><i>Thesis: Approximation Algorithms for Covering and Packing Problems on Paths.</i><br/>Advisors: Professor Amit Kumar and Professor Naveen Garg.</p> <p>INDIAN INSTITUTE OF SCIENCE <span style="float: right;">BANGALORE, INDIA</span><br/>Master of Engineering, Computer Science and Engineering, 2000 – 2002.<br/>Graduated with First Class with Distinction.<br/><i>Thesis: Efficient algorithms for generating all minimum cuts and the Cactus representation of a graph.</i><br/>Adviser: Professor Ramesh Hariharan.</p> <p>JADAVPUR UNIVERSITY <span style="float: right;">KOLKATA, INDIA</span><br/>Bachelor of Engineering, Computer Science and Engineering, 1996 – 2000.<br/>Graduated with First Class with Honors.<br/><i>Project: Simulator for UML diagrams.</i><br/>Adviser: Professor Samiran Chattopadhyay.</p> |

**Experience** DATA61, CSIRO SYDNEY, AUSTRALIA  
November, 2019 – Now  
*Designation:* Senior Research Scientist.  
*Research Area:* Artificial Intelligence, Cyber Security, Machine Learning.  
*Description:* I work on applying artificial intelligence and machine learning algorithms to solve computer security problems such as intrusion detection, user behavior modeling and fraud detection. Some of the projects are: applying different machine learning algorithms to detect phishing and spam webpages, design of a personal information factor, studying myth and rumour propagation in social networks during COVID-19.

UNIVERSITY OF NEW SOUTH WALES SYDNEY, AUSTRALIA  
January, 2021 – Now  
*Designation:* Conjoint Senior Lecturer.  
*Research Area:* Artificial Intelligence, Cyber Security, Machine Learning.  
*Description:* I am a Conjoint Senior Lecturer in the School of Computer Science and Engineering at UNSW Sydney. My responsibilities include teaching courses, supervising PhD students, and mentoring Bachelors and Masters students.

CYBER SECURITY CRC SYDNEY, AUSTRALIA  
November, 2019 – Now  
*Designation:* Senior Research Fellow.  
*Research Area:* Artificial Intelligence, Cyber Security, Machine Learning.  
*Description:* I solve cyber security problems faced by Australian federal government, state governments, and software companies. Some of the projects are: applying different machine learning algorithms to detect phishing and spam webpages, design of a personal information factor, studying myth and rumour propagation in social networks during COVID-19.

TCS RESEARCH AND INNOVATION KOLKATA, INDIA  
March, 2013 – October, 2019  
*Designation:* Research Scientist.  
*Description:* I worked on (1) warehouse automation problems such as multi-robot task allocation, bin packing, truck routing, and job scheduling, (2) legal data mining, citation analysis, and patent analysis (both text and network), (3) fault-tolerance and reliability of smart grids, (4) machine learning and optimization problems such as evacuation planning and vehicle arrival time prediction.

YAHOO! INC BANGALORE, INDIA  
August, 2006 – July, 2007  
*Designation:* Technical Lead.  
*Project:* Strategic Data Solutions.  
*Primary Responsibility:* Design and implementation of analytical and instrumentation products.

COGNIZANT KOLKATA, INDIA  
August, 2005 – July, 2006  
*Designation:* Technical Lead.  
*Project:* Retail Technology Consultancy Group.  
*Primary Responsibility:* To define the charter for Performance Engineering and Capacity Planning across the company. In addition, I do architecture, design, and code review for various projects.

MICROSOFT CORPORATION HYDERABAD, INDIA  
August, 2002 – July, 2005

*Designation:* Software Design Engineer.  
*Project:* Windows Serviceability.  
*Primary Responsibility:* Debugging customer problems in Windows kernel, NTFS, and WDM device drivers. The devices range from USB, SCSI, IEEE 1394.  
*Project:* Microsoft Data Protection Manager.  
*Primary Responsibility:* Design and implementation of UI and Archive Manager.

NOVELL INC BANGALORE, INDIA  
February, 2002 – July, 2002

*Designation:* Software Development Engineer.  
*Project:* Novell DNS Server.  
*Primary Responsibility:* Design and implementation of DNS Name Resolution Service and integration with Novell eDirectory.

### ***Internship***

IBM RESEARCH LABS DELHI, INDIA  
May, 2011 – July, 2011

*Designation:* Intern Researcher.  
*Mentor:* Venkatesan Chakaravarthy, Sambuddha Roy, Yogish Sabharwal.  
*Project:* Approximation Algorithms for Resource Allocation Problems.  
*Job Description:* I worked on design of efficient approximation algorithms for resource allocation for partial covering of jobs. The goal is to meet the demands of a set of jobs using a set of resources with certain capacities at minimum cost.

YAHOO! RESEARCH LABS BANGALORE, INDIA  
May, 2009 – July, 2009

*Designation:* Intern Researcher.  
*Mentor:* Rajeev Rastogi.  
*Project:* Algorithms for XPath wrapper induction and Graph compression.  
*Job Description:* I worked on design of efficient algorithms for compressing the adjacency list representation of graphs, in particular web graphs and social networks. I also worked on designing XPath wrappers for information extraction from HTML and XML documents.

### **Projects**

- **Automatic Assessment and Protection of Personal Information for Data Sharing**  
PRINCIPAL INVESTIGATOR: Dr. Sushmita Ruj, CSIRO's Data61, Sydney, Australia  
CO-PRINCIPAL INVESTIGATOR: Dr. Arindam Pal, CSIRO's Data61, Sydney, Australia  
GRANT AMOUNT: \$1,000,000 AUD
- **IC-IMPACTS: Smart Sensor Deployment in Buildings: Evacuation Planning and Energy Management**  
PRINCIPAL INVESTIGATOR (INDIA): Professor Krithi Ramamritham, Indian Institute of Technology, Bombay, India  
PRINCIPAL INVESTIGATOR (CANADA): Professor Mark Fox, University of Toronto, Canada  
CO-PRINCIPAL INVESTIGATOR (INDIA): Dr. Arindam Pal, TCS Research and Innovation, Kolkata, India  
GRANT AMOUNT: \$150,000 CAD

### **PhD student supervision**

Rizka Purwanto, University of New South Wales, Sydney, Australia

**PhD Thesis:** Multi-Agent Systems for Phishing Detection  
Paheli Bhattacharya, Indian Institute of Technology, Kharagpur  
**PhD Thesis:** Application of Artificial Intelligence to Legal Data Analytics

## Publications

- GRANTED US PATENTS
  1. *Systems and methods for scalable multi-vehicle task allocation*  
Chayan Sarkar, Himadri Sekhar Paul, Arindam Pal, Arijit Mukherjee
  2. *Multi-dimensional sensor data based human behaviour determination system and method*  
Avik Ghose, Arpan Pal, Arindam Pal, Tanushyam Chattopadhyay, Santa Maiti
  3. *Methods and systems for planning evacuation paths*  
Arindam Pal, Gopinath Mishra and Subhra Mazumdar
  4. *Systems and methods for planning location-sensitive probabilistic behavior-based evacuation paths*  
Arindam Pal, Francesco Parisi, Venkatramanan Siva Subrahmanian and Subhra Mazumdar
- BOOKS
  1. *Artificial Intelligence for Cyber Security*  
Arindam Pal, Suranga Seneviratne, and Rahat Masood  
CRC Press (2022).
  2. *Handbook of Artificial Intelligence for Smart City Development: Management Systems and Technology Challenges*  
Sandhya Makkar, Gobinath Ravindran, Ripon Kumar Chakraborty, and Arindam Pal  
Taylor and Francis Group (2022).
- BOOK CHAPTERS
  1. *On the Vulnerability of Community Structure in Complex Networks*  
Viray Parimi, Arindam Pal, Sushmita Ruj, Ponnurangam Kumaraguru, and Tanmoy Chakraborty  
Principles of Social Networking: The New Horizon and Emerging Challenges.
  2. *Fault-tolerance and Reliability of Smart Grids*  
Sushmita Ruj and Arindam Pal  
Encyclopedia of Wireless Networks (2020).
- JOURNALS
  1. *PHISHSIM: Aiding Phishing Website Detection with a Feature-Free Tool*  
Rizka Purwanto, Arindam Pal, Alan Blair and Sanjay Jha  
IEEE Transactions on Information Forensics and Security.
  2. *Legal Case Document Similarity: You Need Both Network and Text*  
Paheli Bhattacharya, Kripabandhu Ghosh, Arindam Pal and Saptarshi Ghosh  
ACM Transactions on Information Systems.
  3. *RP-ELM-HAR: A Random Projection based Ensemble Extreme Learning Machine for Human Activity Recognition*  
Dipanwita Thakur, Suparna Biswas, and Arindam Pal  
IEEE Transactions on Pattern Analysis and Machine Intelligence (submitted).
  4. *Analysis and Insights for Myths Circulating on Twitter During the COVID-19 Pandemic*  
Shuiqiao Yang, Jiaojiao Jiang, Arindam Pal, Kun Yu, Fang Chen and Shui Yu  
IEEE Open Journal of the Computer Society, 1: 209 – 219 (2020).

5. *Editorial: Parallel and Distributed Machine Learning Algorithms for Scalable Big Data Analytics*  
Henri Bal and Arindam Pal  
Future Generation Computer Systems (2020) – **CORE A.**
  6. *Improved Algorithms for the Evacuation Route Planning Problem*  
Gopinath Mishra, Subhra Mazumdar and Arindam Pal  
Journal of Combinatorial Optimization, 36(1): 280–306 (2018) – **CORE A.**
  7. *k-means++ under Approximation Stability*  
Manu Agarwal, Ragesh Jaiswal and Arindam Pal  
Theoretical Computer Science, 588: 37–51 (2015) – **CORE A.**
- **CONFERENCES**
    1. *Hier-SPCNet: A Legal Statute Hierarchy-based Heterogeneous Network for Computing Legal Document Similarity*  
Paheli Bhattacharya, Kripabandhu Ghosh, Arindam Pal and Saptarshi Ghosh  
International ACM SIGIR Conference on Research and Development in Information Retrieval (SIGIR 2020) – **CORE A\***.
    2. *Identification, Tracking and Impact: Understanding the trade secret of catchphrases*  
Jagriti Jalal, Mayank Singh, Arindam Pal, Lipika Dey and Animesh Mukherjee  
ACM/IEEE Joint Conference on Digital Libraries (JCDL 2020) – **CORE A\***.
    3. *PhishZip: A New Compression-based Algorithm for Detecting Phishing Websites*  
Rizka Purwanto, Arindam Pal, Alan Blair and Sanjay Jha  
IEEE Conference on Communications and Network Security (CNS 2020).
    4. *Towards IoT Security Automation and Orchestration: Challenges and Future Directions*  
Yifeng Zheng, Arindam Pal, Sharif Abuadbbba, Shiva Raj Pokhrel, Surya Nepal and Helge Janicke  
IEEE International Conference on Trust, Privacy and Security in Intelligent Systems, and Applications (TPS 2020).
    5. *HushRelay: A Privacy-Preserving, Efficient, and Scalable Routing Algorithm for Off-Chain Payments*  
Subhra Mazumdar, Sushmita Ruj, Ram Govind Singh and Arindam Pal  
IEEE International Conference on Blockchain and Cryptocurrency (ICBC 2020).
    6. *Innovation and Revenue: Deep Diving into the Temporal Rank-shifts of Fortune 500 Companies*  
Mayank Singh, Arindam Pal, Lipika Dey and Animesh Mukherjee  
ACM India Joint International Conference on Data Science and Management of Data (CoDS-COMAD) 2020.
    7. *Methods for Computing Legal Document Similarity: A Comparative Study*  
Paheli Bhattacharya, Kripabandhu Ghosh, Arindam Pal and Saptarshi Ghosh  
International Workshop on Legal Data Analysis (LDA 2019)  
International Conference on Legal Knowledge and Information Systems (JURIX 2019).
    8. *A scalable multi-robot task allocation algorithm*  
Chayan Sarkar, Himadri Sekhar Paul and Arindam Pal  
IEEE International Conference on Robotics and Automation (ICRA) 2018 – **CORE A.**

9. *Measuring Similarity among Legal Court Case Documents*  
Arpan Mandal, Raktim Chaki, Sarbajit Saha, Kripabandhu Ghosh, Arindam Pal and Saptarshi Ghosh  
ACM COMPUTE 2017.
10. *Automatic Catchphrase Identification from Legal Court Case Documents*  
Arpan Mandal, Kripabandhu Ghosh, Arindam Pal and Saptarshi Ghosh  
ACM International Conference on Information and Knowledge Management (CIKM) 2017 – **CORE A**.
11. *Understanding the Impact of Early Citers on Long-Term Scientific Impact*  
Mayank Singh, Ajay Jaiswal, Priya Shree, Arindam Pal, Animesh Mukherjee and Pawan Goyal  
ACM/IEEE-CS Joint Conference on Digital Libraries (JCDL) 2017 – **CORE A\***.
12. *A Graph Analytics Framework for Ranking Authors, Papers and Venues*  
Arindam Pal and Sushmita Ruj  
International Workshop on Mining and Learning with Graphs (MLG 2016)  
ACM SIGKDD International Conference on Knowledge Discovery and Data Mining (KDD) 2016.
13. *Automatic Discovery of Emerging Trends using Cluster Name Synthesis on User Consumption Data*  
Tanushyam Chattopadhyay, Santa Maiti, Arindam Pal, Avik Ghose and Arpan Pal  
Wiki Workshop, International World Wide Web Conference (WWW 2016).
14. *Preferential Attachment Model with Degree Bound and its Application to Key Predistribution in WSN*  
Sushmita Ruj and Arindam Pal  
IEEE International Conference on Advanced Information Networking and Applications (AINA) 2016.
15. *Improved Algorithms for the Evacuation Route Planning Problem*  
Gopinath Mishra, Subhra Mazumdar and Arindam Pal  
9th Annual International Conference on Combinatorial Optimization and Applications (COCOA) 2015.
16. *CITEX: A new citation index to measure the relative importance of authors and papers in scientific publications*  
Arindam Pal and Sushmita Ruj  
IEEE International Conference on Communications (ICC) 2015 – **CORE A**.
17. *Historical Data based Real Time Prediction of Vehicle Arrival Time*  
Santa Maiti, Arpan Pal, Arindam Pal, Tanushyam Chattopadhyay and Arijit Mukherjee  
17th IEEE International Conference on Intelligent Transportation Systems (ITSC) 2014.
18. *Analyzing Cascading Failures in Smart Grids under Random and Targeted Attacks*  
Sushmita Ruj and Arindam Pal  
28th IEEE International Conference on Advanced Information Networking and Applications (AINA) 2014.
19. *k-means++ under Approximation Stability*  
Manu Agarwal, Ragesh Jaiswal and Arindam Pal  
10th Annual Conference on Theory and Applications of Models of Computation (TAMC) 2013.

20. *Approximation Algorithms for Unsplittable Flow Problems on Paths and Trees*  
Khaled Elbassioni, Naveen Garg, Divya Gupta, Amit Kumar, Vishal Narula and Arindam Pal  
32nd Annual Conference on Foundations of Software Technology and Theoretical Computer Science (FSTTCS) 2012.
21. *Scheduling resources for executing a partial set of jobs*  
Venkatesan Chakaravarthy, Arindam Pal, Sambuddha Roy and Yogish Sabharwal  
32nd Annual Conference on Foundations of Software Technology and Theoretical Computer Science (FSTTCS) 2012.
22. *A Token-based Distributed Algorithm for Total Order Atomic Broadcast*  
Sandip Dey and Arindam Pal  
International Workshop on Distributed Computing (IWDC) 2002, Lecture Notes in Computer Science (LNCS) 2571.

## Services

### – Journals

#### *Technical Reviewer*

- \* ACM Transactions on Internet Technology
- \* ACM Transactions on Knowledge Discovery from Data
- \* AMS Mathematical Reviews
- \* IEEE Computer Magazine
- \* IEEE Transactions on Automation Science and Engineering
- \* IEEE Transactions on Big Data
- \* IEEE Transactions on Computational Social Systems
- \* IEEE Transactions on Dependable and Secure Computing
- \* IEEE Transactions on Emerging Topics in Computing
- \* IEEE Transactions on Knowledge and Data Engineering
- \* IEEE Transactions on Network and Service Management
- \* IEEE Transactions on Neural Networks and Learning Systems
- \* IEEE Transactions on Signal Processing
- \* Information Systems Frontiers
- \* Journal of Artificial Intelligence Research
- \* Journal of Parallel and Distributed Computing
- \* Scientometrics
- \* Sadhana
- \* Theoretical Computer Science

### – Conferences

#### *Organization and Technical Program Committee*

- \* TPC Member of **ACM SIGKDD Conference on Knowledge Discovery and Data Mining (KDD 2022)**
- \* TPC Member of **The Web Conference (WWW 2022)**
- \* TPC Member of **The 60th Annual Meeting of the Association for Computational Linguistics (ACL 2022)**
- \* TPC Member of **IEEE BigData 2022**
- \* TPC Member of IEEE International Conference on Blockchain and Cryptocurrency (ICBC) 2022
- \* TPC Member of **International Conference on Machine Learning 2021**

- \* TPC Member of **ACM SIGKDD Conference on Knowledge Discovery and Data Mining (KDD 2021)**
- \* TPC Member of **IEEE BigData 2021**
- \* TPC Member of **ACL-IJCNLP 2021**
- \* **Organizing Committee Member** of Symposium on Artificial Intelligence and Law (SAIL) 2021
- \* **Organizing Committee Member** of CSCRC CSIRO Data61 Seminar Series

## Talks

1. *Detecting Phishing Websites: A Tale of Two Algorithms*  
**Keynote Talk**, International Conference on Distributed Computing and Networking (ICDCN 2022), January 7, 2022.
2. *BB.Evac: A Fast Location-Sensitive Algorithm for Probabilistic Behavior-Based Building Evacuation*  
**Invited Talk**, OPTIMA Seminar Series  
 University of Melbourne, December 15, 2021.
3. *Approximate Counting and Markov Chain Monte Carlo: A Randomized Approach*  
 School of Computer Science and Engineering  
 UNSW Sydney, November 11, 18, 25, 2021.
4. *VRank: A New Algorithm to Compute the Influence of Users and Posts in Online Social Networks*  
**Keynote Talk**, 20th IEEE/WIC/ACM International Conference on Web Intelligence and Intelligent Agent Technology, December 14, 2021.  
**Invited Talk**, Missouri University of Science and Technology, USA, September 17, 2021.  
 Birla Institute of Technology and Science, Pilani – Goa, August 31, 2021.  
 School of Computer Science and Engineering, UNSW Sydney, August 26, 2021.
5. *Machine Learning Algorithms for Detecting Phishing Websites*  
**Invited Talk**, CDMS Research Seminar  
 School of Computer, Data and Mathematical Sciences, Western Sydney University, May 13, 2021.