

SUNANDAN CHAKRABORTY

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RESEARCH INTERESTS

Text and Data Mining, Machine Learning, Big Data Analytics, Computational Sustainability, Computation for Development (ICTD)

EDUCATION

- **PhD (2015):** Department of Computer Science, New York University, USA
- **MS (2008):** Dept. of Computer Science and Engineering, Indian Institute of Technology (IIT) Kharagpur, INDIA
- **B.Tech (2004):** Computer Science & Engineering, University of Kalyani, INDIA

AWARDS AND PRIZES

- Winner of Grand Prize of the Wildlife Crime Tech Challenge organized by USAID in 2015 [4 grand prize winners among 300 submissions]
- Winner of Janet Fabri Prize from Courant Institute of Mathematical Science (2016) [Among ~20 other thesis submission]
- Winner of Harold Grad Memorial (2013) from Courant Institute of Mathematical Sciences for outstanding performance and promise as a graduate student [Selected among ~16 other PhD students]
- Awarded the ACM/SIGIR Travel Grant to attend International Conference on Information Retrieval (SIGIR) 2014, Gold Coast, Australia

PROFESSIONAL EXPERIENCE

- **Assistant Professor, School of Informatics and Computing, Indiana University Purdue University Indianapolis (Aug 2017 - present)**
- **Post-doctoral Researcher, Center for Data Science, New York University (Sep 2015 – present)**
 - **Tracking illegal wildlife trade on the Web:** Building a tool to detect illegal wildlife trades on the Internet. The purpose of this tool is to provide law enforcement agencies a platform to detect such activities and take action to reduce threats on endangered species.
 - **Measuring unemployment indicators using social media data:** Predicting unemployment rate prior to announcement using social media and news data related to jobs and job market
 - **Intuits: A new vocabulary to represent the creolization of the Web:** This project is aimed at building a new language, with a novel way of defining vocabulary and grammar. We are calling the vocabulary – intuits. The intuit vocabulary will follow rules of the grammar that will be generated following a natural process of “creolization” over time.
- **PhD, Computer Science Department, New York University, USA (Sep 2010 – Sep 2015)**

Advisor: Prof. Lakshminarayanan Subramanian

Projects:

 - **News analytics Engine:** From a corpus of news articles, extraction of events and characterizing the cause and effects of these events based on location and time. Methodology is based on *spatial-temporal relationship analysis, topic modeling and event extraction* from the news documents

- **Collection of Localized Food Production and Transportation Data through Mobile Apps:** Using customized Android mobile apps, collecting food production and transportation data in a region, involving the local farming community. Using these data to analyze food price and how production rate and transportation costs effect food price in a region.
- **Computing the Rate of Disappearance of Arable Land using Satellite Images:** Building a tool that can classify Google Earth satellite images into various classes, like, agricultural, industrial, urban etc. Trends in the change of land pattern of a region over the past few years are identified from this classified images using the latest as well as historical satellite images of the region.
- **Location-Specific Summarization of Climatic and Agricultural Trends:** Mining information from the web to collect data about agriculture, climate change, identify and predict the presence of different problems in these areas in a particular location, using *information extraction, sentiment analysis and text summarization methods*.
- **A New Search Abstraction for Mobile Search Users:** we propose *Summarization Search*, a new search abstraction for mobile users where the basic goal is to provide a single summarized and relatively complete search response for every user search query. This approach will eliminate the need for exploration to result pages after each search, which is particularly beneficial for mobile search users.
- **Structured summarization of unstructured text:** In some cases, users search a website where the website text is in an unstructured form. However, the user query is in a structured format. Changing the backend text into a structured form can greatly improve the search quality, search speed and the presentation of the results. This project is aimed to extract key features from such texts and prepare a structured summary in the form of (label, value) pairs of the entire content, taking Craigslist ads as a case.
- **Research Intern, Machine Learning and Perceptron Group, MSR Lab Cambridge, UK (Oct, 2013 – Dec, 2013)**
Mentors: Milad Shokouhi and Filip Radlinski
 - **Novel Evaluation Techniques for Ranking Functions of Information Retrieval Systems:** Designing and evaluating a new metric for evaluation of information retrieval systems including ranking functions in web search engines.
- **Research Intern, Search Labs, MSR Lab Silicon Valley, USA (Summer, 2011)**
Mentors: Krishnaram Kenthapadi, Rakesh Agrawal
 - **Diagnosing Comprehension Load in Textbooks.** Mining high school textbooks from India to identify important concepts/keywords and how they are related to each other. Using them to try to understand how their sequence of appearance within the textbooks impose burden on the reader. Also, how to reorganize the books so that it can help the readers to understand the content of the book better.
- **Research Intern, MSR Lab India, India (November, 2008 – September, 2009)**
Mentors: Kentaro Toyama and Aishwarya Ratan
 - **Technology-based Solutions for Microfinance:** Developing microfinance applications on mobile phones and handheld devices to complete and record the whole meeting transactions in situ. This is to alleviate the usual problems in the existing pen and paper based system.
- **Senior Project Asst., Communication Empowerment Lab, IIT Kharagpur, India (July, 2004 – October, 2008)**
Advisors: Prof Anupam Basu and Prof Sudeshna Sarkar
Thesis Title: *Shikshak*: A Framework for an Intelligent Tutoring System
 - **A Multimodal Participatory Tutoring System for the Rural Children:** An Intelligent Tutoring System that delivers education materials (with different types and difficulty level) based on a student's cognitive ability. Mainly targeted for areas where there is a dearth of trained teachers.
 - **Development of a Hardware-Software Multimedia System for Students with Cerebral Palsy and Communication:** A special interface for students with neuro-motor disorders using which they can access a normal PC for learning as well as for communication.

PUBLICATIONS

- **Sunandan Chakraborty**, Lakshminarayanan Subramanian, (2016). "Extracting Signals from News Streams for Disease Outbreak Prediction", *GlobalSIP 2016, Washington DC, USA*
- Christopher Rohlf, **Sunandan Chakraborty** and Lakshminarayanan Subramanian (2016). The Effects of the Content of FOMC Communications on US Treasury Rates. *EMNLP 2016* [acceptance rate: 22%]
- **Sunandan Chakraborty**, Ashwin Venkataraman, Srikanth Jagabathula, Lakshminarayanan Subramanian (2016). Predicting Socio-Economic Indicators using News Events. *KDD 2016* [acceptance rate: 18%]

- **Sunandan Chakraborty**, Zohaib Jabbar, Lakshminarayanan Subramanian, Yaw Nyarko (2016). Satellite Image Analytics, Land Change and Food Security. KDD Workshop on Data Science for Food, Energy and Water (DSFEW 2016).
- **Sunandan Chakraborty**, Filip Radlinski, Milad Shokouhi, and Paul Baecke (2014). On Correlation of Absence Time and Search Effectiveness, in Proceedings of the ACM International Conference on Research and Development in Information Retrieval (SIGIR), ACM, July 2014 [acceptance rate: 30%]
- **Sunandan Chakraborty** and Lakshminarayanan Subramanian. (2014). Extraction of (label,value) Pairs from Unstructured Ads. AAAI Fall Symposium: Natural Language Access to Big Data, Arlington, VA, 2014 [acceptance rate: 28%]
- **Sunandan Chakraborty**, Tiffany Tong, Jay Chen, Afshan Aman, Talal Mufti, Yaw Nyarko and Lakshminarayanan Subramanian. (2013). Experiences in Designing a Mobile GIS Mapping Tool for Rural Farmers in Ghana. DEV 2013. [Among Top 2 conferences on ICTD]
- Rakesh Agrawal, **Sunandan Chakraborty**, Sreenivas Gollapudi, Anitha Kannan, and Krishnamurthy Kenthapadi. (2012), Empowering Authors to Diagnose Comprehension Burden in Textbooks, in ACM SIGKDD Conference on Knowledge Discovery and Data Mining (KDD), 2012. *Beijing, China* [acceptance rate: 18%]
- **Sunandan Chakraborty**, Scot Dalton, Yaw Nyarko and Lakshminarayanan Subramanian. (2012). Computing the Rate of Disappearance of Cropland Using Satellite Images. International Conference of Computational Sustainability (CompSust, 2012). *Copenhagen, Denmark*
- Rakesh Agrawal, **Sunandan Chakraborty**, Sreenivas Gollapudi, Anitha Kannan, and Krishnamurthy Kenthapadi. (2012). Quality of Textbooks: An Empirical Study, in ACM Symposium on Computing for Development (ACM DEV 2012)
- **Sunandan Chakraborty**, Jay Chen, Mangala Kanthamani, Lakshminarayanan Subramanian. (2012). On the Feasibility and Utility of Web based Educational Lesson Plans. ACM Symposium On Computing For Development (ACM DEV 2012), *Atlanta, GA*
- **Sunandan Chakraborty**, Lakshminarayanan Subramanian. (2011). Location Specific Summarization of Climatic and Agricultural Trends. International World Wide Web Conference (WWW 2011), *Hyderabad, India* [acceptance rate: 16%]
- Aishwarya Lakshmi Ratan, **Sunandan Chakraborty**, Pushkar V. Chitnis, Kentaro Toyama, Keng Siang Ooi, Matthew Phiong, Mike Koenig, (2010). Managing Microfinance with Paper, Pen and Digital Slate. International Conference On Information And Communication Technologies And Development (ICTD 2010), *London, UK*.
- **Sunandan Chakraborty**, Devshri Roy, and Anupam Basu. "Development of knowledge based intelligent tutoring system." *Advanced Knowledge Based Systems: Model, Applications & Research 1* (2010): 74-100.
- **Sunandan Chakraborty**, Tamali Bhattacharya, Plaban Bhowmick, Anupam Basu and Sudeshna Sarkar. (2007). Shikshak: An Intelligent Tutoring System Authoring Tool for Rural Education. IEEE/ACM International Conference On Information And Communication Technologies And Development (ICTD 2007), *Bangalore, India*
- Plaban Bhowmick, Samiran Sarkar, Sudeshna Sarkar, Anupam Basu and **Sunandan Chakraborty**. (2007). Samvidha: A ICT System for Personalized Offline Internet Access for Rural Schools. IEEE/ACM International Conference On Information And Communication Technologies And Development (ICTD2007), *Bangalore, India*.
- **Sunandan Chakraborty**, Devshri Roy, Anupam Basu, (2008). Shikshak: An Architecture for an Intelligent Tutoring System. *International Workshop of Cognitive Aspects in Intelligent and Adaptive Web-based Educational Systems (CIAWES, 2008) held in conjunction ICCE, 2008. Taipei, Taiwan*.
- **Sunandan Chakraborty**, Devshri Roy, Anupam Basu, (2008). Semiautomatic Annotation of Test Materials in an ITS Authoring System. *International Workshop of Cognitive Aspects in Intelligent and Adaptive Web-based Educational Systems (CIAWES, 2008) held in conjunction ICCE, 2008. Taipei, Taiwan*.

WORKING PAPERS

- Sunandan Chakraborty, Ashwin Venkataraman and Lakshminarayanan Subramanian. Recurrent Event Networks for Predicting Fluctuations in Societal Indices (*under submission*)
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PATENTS

- Aishwarya Lakshmi Ratan, Pushkar V. Chitnis, Sunandan Chakraborty. Handwritten Paper-Based Input Digital Record Management. US Patent. Publication Date: 12/29/2011
- [Provisional] Bhubaneswar Mishra, Sunandan Chakraborty. Intuits: A New Vocabulary to Represent the Creolization of the Web

OTHER ACADEMIC ACTIVITIES

- Program committee member for 1st International Conference on computing & sustainable societies (ACM COMPASS 2018)
- Program Committee member of Social Sensing and Enterprise Intelligence : Towards a Smart Enterprise Transformation Workshop in International Web Conference (WWW 2018)
- Program committee member for 8th International Conference on Information & Communication Technologies and Development (ICTD 2017)
- Program committee member for 9th International Conference on Knowledge Discovery and Information Retrieval (KDIR 2017)
- Program committee member for 24th ACM International Conference on Information and Knowledge Management (CIKM 2015)
- Program committee member for 8th International Conference on Information & Communication Technologies and Development (ICTD 2016)
- Program committee member for 8th International Conference on Knowledge Discovery and Information Retrieval (KDIR 2016)
- Program committee member for IEEE TechSym conference (2014)
- Served as a reviewer for PLOS One Journal
- Served as a reviewer for Journal of Big Data
- Served as a reviewer for International Journal on Knowledge and Information Systems
- Served as a reviewer for IEEE Transactions on Mobile Computing
- Served as a reviewer for IEEE Pervasive Computing

INVITED TALKS

- "Automatic Extraction of Protest Crowd Size from News Articles", Annual Moore-Sloan Data Science Summit, New Orleans, LA, United States (November 7, 2017).
- "Enforcement Gaps Interface: Detecting Illegal Internet Wildlife Trade", Workshop, AI for Social Good, USC Center for Artificial Intelligence in Society, University of Southern California, Los Angeles, CA, US (October 4, 2017).
- "Cloud Computing for Big Data Analytics", Dept. of Biostatistics, IUPUI (Oct 20, 2017)
- "Illegal Wildlife Trade on the Web", Postdoc Research Showcase, NYU, New York, NY, US (May 10, 2017).
- "A Computational Model to Detect Illegal Wildlife Sales Online", Conference on Computational Sustainability, Cornell University, Ithaca, NY, United States (July 7, 2016)
- "Big Data Analytics for Development", Otaniemi seminar series Helsinki Institute for Information Technology (HIIT), Helsinki, Finland (November 4, 2013)

TEACHING

- Spring 2018: H599 Deep Learning Neural Networks
- Fall 2017: H516 Applied Cloud Computing For Data Intensive Sciences
- Summer 2016: DS-GA 1009 Practical Training Course (NYU)