Ioannis Arapakis

Curriculum Vitae

Contact

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Summary

I hold a Ph.D. in Information Retrieval and a M.Sc. degree in Information Technology (specialisation in Interactive Systems Engineering). During the last four years I have worked as a scientist at Yahoo Labs, where I have been conducting research in the areas of Data Mining, IR, and HCI. Over this period I have been an active member of the (1) User Engagement, (2) Web Retrieval and (3) Ad Processing and Retrieval groups, I have led several internal projects (see Section "Key Internal Projects"), and have achieved several high quality publications (see Section "Publications").

My diverse set of theoretical knowledge, technical skills, and industrial expertise, allows me to analyse, understand and model rich data repositories, and contribute to scientific innovation both in industry and society. My insatiable curiosity constantly reveals me to new and exciting knowledge domains and research problems, which I am always willing to explore. I am intrigued about the applications of Internet-of-Things technologies for developing innovative behaviour interpretation algorithms and methods that can account for the contextual, personal and historical information of user activity, while drawing knowledge from data mining, machine learning and neuroscience. I am also interested in methods for leveraging knowledge inferred from biowearables and laboratory tests with the help of online behaviour metrics acquired through **automatic**, **low-cost**, and **scalable** techniques.

Education

2007–2010 **Ph.D.** in Computer Science — **University of Glasgow**
Thesis: "Affect-Based Information Retrieval"
Supervisors: Prof. Joemon M. Jose, Dr. Phil Gray, Prof. C. J. Keith van Rijsbergen
Glasgow, United Kingdom

2005–2007 **M.Sc.** in Information Technology — **Royal Institute of Technology (KTH)**
with a specialisation in Interactive Systems Engineering
Supervisor: Asst. Prof. Teresa Cerratto Pargman
Stockholm, Sweden

2003–2004 Erasmus & Leonardo — **Lahti Polytechnic**
Lahti, Finland

1999–2004 **B.Sc. (Hons)** in Information Technology — **Alexander Technological Educational Institute of Thessaloniki**
Thessaloniki, Greece

Research Interests

- **Data Mining** (pattern recognition, predictive modelling, statistical inference, time series analysis, deep neural networks)
- **Information Retrieval** (multimedia mining and search, user modelling, personalised search systems, recommender systems, evaluation and applications)
- **Human-Computer Interaction** (experimental methods, user engagement, neuro-physiological signal processing, sentiment analysis)

Research Experience

2016–Present **Eurecat** — Barcelona, Spain
Senior Data Scientist

I joined Eurecat (Technological Center of Catalunya) as a Senior Data Scientist in 2016 and continued my collaboration with Yahoo Labs as an external collaborator, under the academic program ARC. Since then, I have been a member of the Data Science Group lead by Dr. Francesco Bonchi (Eurecat/ISI) and Dr. Carlos Castillo (Eurecat), and have been collaborating closely with the Principal Research Scientist Fabrizio Silvestri (Yahoo Labs London).

The main lines of research conducted by the Data Science Group evolve around social networks, social media, privacy and security, user engagement, predictive modelling, and geospatial analysis, among others. I am currently working on several projects in collaboration with industrial partners like Privalia, Zurich Insurance, and La Vanguardia. In addition, I am working jointly with Pr. Nuno C. Marques on the analysis of financial data for understanding the world economy. More specifically, we are researching ways that online news can explain the oscillations observed in financial streaming data (financial stream mining) and provide insights.

2011–2015 **Yahoo Labs** Barcelona, Spain
Researcher

Since September 2011 I have been working as a Research Scientist at Yahoo Labs Barcelona (Spain) and have been an active member of the (1) User Engagement, (2) Web Retrieval, and (3) Ad Processing and Retrieval research groups. While at the aforementioned groups, I have researched user-centric analytics at controlled environments as well as at large-scale, developed methods for user behaviour modelling, performed web content analysis for cold-start recommendation techniques, as well as researched user engagement using online and offline signals.

More broadly, my role involved:

- Leading and executing novel research projects (see Section "Key Internal Projects") in the areas of user engagement, web search, and ad analytics, producing data-driven research insights; generating novel metrics and experiments to assess online engagement and conversion; and presenting key findings and research product recommendations.
- Demonstrating scientific excellence and world-class external visibility through publications, presentations and external collaborations at top-tier international conferences, high-impact journals, and academic venues. Examples of research problems that I have addressed are related to pattern recognition, predictive modelling, multimedia mining and search, social media analysis, machine-learned sentiment extraction, and ad retrieval.
- Working closely with product teams and business units to identify, define and execute strategic research directions and plans for the company.
- Coordinating the preparation of several internal and research grants with various academic and industrial partners; among these attempts, the FP7 ICT 2013 MULTISENSOR was ranked second and was initiated in November 2013 and a collaboration with the University of Edinburgh was established under Yahoo's Faculty Research and Engagement Program (FREP) 2013.

2008 **Centre for Research & Technology, ITI** Thessaloniki, Greece
Research Internship

- Investigated user online behaviour in the context of multimedia search though a series of online and offline controlled experiments.
- Researched methods for jointly modelling user behaviour signals correlated with interest and engagement (e.g., facial expressions from 2D and 3D camera, electroencephalography, electrodermal activity, heart rate) to personalise information access and recommendation techniques.
- Developed a novel search environment that worked on top of Yahoo Search API and offered recommendations of unseen multimedia items.

2003–2004 **TestSoft Ltd.** Lahti, Finland
Undergraduate Internship

- Revised the RosettaNet Self-Test Kit (STK).
- Implemented a series of security improvements and technical modifications on the STK.
- Documented the business logic and technology of STK.

Research Skills

- Statistical inference (parametric/non-parametric methods) and time series analysis.
- Regression analysis (univariate/multivariate, linear/non-linear modelling).
- Machine learning (supervised and unsupervised learning, feature engineering, data transformations).
- Observational and experimental user studies (online and offline), A/B testing.
- Pertinent modalities and techniques like neuro-physiological signal processing (EEG, EDA, BVP, HR), observer (eye tracking, facial expression analysis), and self-report methods (questionnaires, think-aloud protocols, interviews).
- Modern application design and development methodologies (ethno-mining, grounded theory methodology).

Technical Skills

- **Programming:** Java (expert), Python (basic), Matlab (prior experience), C++ (prior experience), UNIX shell scripting (proficient).
- **Scripting Languages, Web Tools and Frameworks:** J2EE, JavaServer Pages, JavaScript, PHP, HTML, DHTML (proficient).
- **Data Mining Platforms:** Weka (expert), Caret (expert), TiMBL (prior experience).
- **Statistical Analysis:** R (expert), SPSS (expert).
- **DBMSs:** MySQL (prior experience).
- **Large-scale Analytics:** Hadoop/Pig (experience with data processing at Yahoo Labs grid), Spark (basic).
- **Web Retrieval and Crawling:** Indri (prior experience), Apache Solr (prior experience).
- **Experience in all project stages:** Research, design, development, testing, and debugging.

Internal Projects

- **Impact of search latency on user engagement in web search [13, 15, 17]:** The users show high variation in the way they perceive the response latency of a web service as this depends on users' demographics, context, and potentially many other factors. Therefore, search results could be served to each user at custom latencies depending on the estimated behavioural impact of latency on the users, while minimising the usage of hardware resources. My focus in this project has been on devising mechanisms for accurate prediction of user-perceived response latency as well as the impact of latency on user experience. In follow-up work, I plan to develop proper models for personalising response latency on a per-user basis, eventually aiming to achieve financial cost savings for the search engine company without hurting users' engagement and satisfaction.
- **Ad Retrieval [6]:** In this project, I am looking into methods for effective <*query*, *ad*> matching, to promote higher engagement with ads, improve CTR, and increase advertisement revenues. More specifically, I am investigating latent associations between queries and ads using machine learning techniques and NLP features.
- **Predicting long-term user engagement:** In this work, I investigated users' long-term engagement with a web site. In particular, I analysed the interactions of a large sample of users with the Yahoo News portal and characterised long-term user engagement by means of different metrics. I also investigated the feasibility of predicting long-term engagement using short-term interaction signals, by employing both classification and regression techniques. The findings of this work will have important implications for Internet companies, where long-term user engagement is likely to lead to better monetisation and customer retention (i.e., reduced churn).
- **Modelling news article quality [1, 3, 4, 16]:** The goal of this project is to identify certain proxies for characterising news article quality in an automatic and scalable way. In order to learn predictive models that can accurately estimate the perceived quality of news articles, I generated a ground-truth dataset with the help of expert judges. To this end, I performed an editorial study and created an in-domain, annotated news corpus. Using this annotated news corpus, I learned models that use shallow, syntactic, probabilistic and more complex features, to perform accurate, domain-specific, news article quality prediction and sentiment classification. In addition, I am researching methods for computing the reputation of named-entities that appear in news articles and I am also investigating ways to predict the degree of controversy in news.
- **Scalable mouse tracking analysis for inferring user intent [8, 18]:** The measurement of within-content engagement remains a difficult and unsolved task, partly because of the lack of standardised, well-validated methods of measurement, especially in an online context. To this end, I performed a study where I observed how users respond to online news in the presence or lack of interest. I collected mouse tracking data, which are known to correlate with visual attention, and examined how cursor behaviour can inform user engagement measures by using an unsupervised learning approach.
- **Knowledge Module engagement [8, 10]:** Existing approaches to measuring user engagement with specific SERP modules are limited to traditional metrics like click-through rate or dwell time, which are not available or suitable in the context of the knowledge module. To address this gap, I examined what fraction of the daily Yahoo search users notice it, and to what extent they perceive it as a useful aid to their search activities. I also collected and analysed users' mouse interactions over a number of SERPs, and investigated the feasibility of predicting the answer to the above questions by using implicit, low-cost, and scalable feedback signals.
- **Discovery and localisation of points of interest [2]:** This project involves accurately locating points of interest visible in photos, by exploiting the location information and compass orientation supplied by modern photo cameras. This is accomplished by analysing the fields of view of the cameras capturing the scenes, while taking the inaccuracy of the sensors providing these measurements into account. My contribution involves a rigorous evaluation of the models' performance against different baselines, using machine learning and statistical analysis techniques.
- **Linking entities to past articles [4, 19]:** One aspect of engagement deals with keeping users on the site longer, by allowing them to navigate through content with enhanced, click-through experiences. So far these links have been manually curated by professional editors, and due to the manual effort involved, the use of such links has been limited. To address this issue, I participated in the design and evaluation of an automated approach to detecting and linking newsworthy events to associated articles.

EU Projects

- **MULTISENSOR:** Mining and Understanding of multilinguaL contenT for Intelligent Sentiment Enriched coNtext and Social Oriented inteRpretation [FP7-610411 - ICT STREP, Score: 14.5/15] **(co-author)**
- **Social Data Reporter:** Multilingual and multimodal news investigation in social media [ICT STREP, Score: 13/15] **(co-author)**
- **i-Self:** Interpreting uSer bEhaviour in sociaL platForms [ICT FET-X] **(co-author)**
- **InfoCon:** Information@Context [ICT FET-X] **(co-author)**
- **ANEMONA:** Affective humaN Experiences during Media Online interAction [Marie Curie ITN] **(co-author)**
- **CENIT:** Consorcios Estratégicos Nacionales en Investigación Técnica [CEN-20091025]
- **ExCAPE:** Exploiting Cultural Artefacts for Personal Experiences [ICT STREP] **(co-author)**
- **CORIFEO:** Context Oriented Retrieval of Implicit Feedback Enhanced Objects [FP7-ICT-2011-7] **(co-author)**
- **KSpace:** Knowledge Space of semantic inference for automatic annotation and retrieval of multimedia content [FP6-027026 - ICT STREP]
- **MIAUCE:** Multi-modal Interactions Analysis and exploration of Users within a Controlled Environment [FP6-033715 - ICT STREP]

Awards

2014 **Travel Award** **FORTH, Heraklion, Greece**
3rd MUMIA Training School on Information Retrieval and Interactive Information Access

2010 **Best Student Paper Award** **SIGIR**
A comparison of general vs personalised affective models for the prediction of topical relevance. In *Proceedings of the 33rd Annual ACM SIGIR Conference on Research and Development in Information Retrieval*. pp. 371-378.

2010 **Travel Award** **SIGIR**
33rd Annual ACM SIGIR Conference on Research and Development in Information Retrieval

Publications

Journal Papers

1. **I. Arapakis**, B. Barla Cambazoglu, and M. Lalmas. **On the Feasibility of Predicting News Popularity at Cold Start**. In *Journal of the American Society for Information Science and Technology*, 2016.
2. B. Thomee, **I. Arapakis**, and D. A. Shamma. **Finding social points of interest from georeferenced and oriented online photographs**. In *ACM Transactions on Multimedia Computing*, 12(2), 2016.
3. **I. Arapakis**, M. Lalmas, B. Barla Cambazoglu, M. C. Marcos, and J. M. Jose. **User Engagement in Online News: Under the Scope of Sentiment, Interest, Affect, and Gaze**. In *Journal of the American Society for Information Science and Technology*, 65(10):1988-2005, 2014.
4. **I. Arapakis**, M. Lalmas, H. Ceylan, and P. Donmez. **Automatically Embedding Newsworthy Links to Articles: From Implementation to Evaluation**. In *Journal of the American Society for Information Science and Technology*, 65(1):129-145, 2013.
5. I. Lopatovska, and **I. Arapakis**. **Theories, methods and current research on emotions in library and information science, information retrieval and human-computer interaction**. In *Information Processing & Management*, 47(4):575-592, 2011.

Conference Papers

6. L. Aiello, **I. Arapakis**, R. Baeza-Yates, X. Bai, N. Barbieri, A. Mantrach, and F. Silvestri. **The Role of Relevance in Sponsored Search**. In *Proceedings of the 25th ACM International Conference on Information and Knowledge Management*, 2016.
7. **I. Arapakis**, F. Peleja, B. Barla Cambazoglu, and J. Magalhães. **Linguistic Benchmarks of Online News Article Quality**. In *Proceedings of the 54th Annual Meeting of the Association for Computational Linguistics*, 2016.
8. **I. Arapakis**, and L. A. Leiva. **Predicting User Engagement with Direct Displays in Web Search Using Mouse Cursor Features**. In *Proceedings of the 39th International ACM SIGIR Conference on Research and Development in Information Retrieval*, 2016.
9. F. Peleja, **I. Arapakis**, and J. Magalhães. **Explanatory opinions: to whom or what is all the fuzz about?**. In *Proceedings of the 6th BCS-IRSG Symposium on Future Directions in Information Access*, pp. 74-77, 2015.

10. **I. Arapakis**, B. Barla Cambazoglu, and L. A. Leiva. **Know Your Onions: Understanding the User Experience with the Knowledge Module in Web Search**. In *Proceedings of the 24th ACM International Conference on Information and Knowledge Management*, pp. 1695-1698, 2015.
11. A. Pereda-Baòos, **I. Arapakis**, and M. Barreda-Àngeles. **On Human Information Processing in Information Retrieval** (Position Paper). In *Proceedings of the 2015 SIGIR Workshop on Neuro-Physiological Methods in IR*, 2015.
12. M.-C. Marcos, F. Gavin, and **I. Arapakis**. **Effects of Snippets on User Experience in Web Search**. In *Proceedings of the 16th International Conference on Human-Computer Interaction (Interacción)*, 2015.
13. M. Barreda-Àngeles, **I. Arapakis**, X. Bai, B. Barla Cambazoglu, and A. Pereda-Baòos. **Unconscious Physiological Effects of Search Latency on Users and Their Click Behaviour**. In *Proceedings of the 38th International ACM SIGIR Conference on Research and Development in Information Retrieval*, pp. 203-212, 2015.
14. S. Vrochidis, I. Kompatsiaris, G. Casamayor, **I. Arapakis**, R. Busch, V. Alexiev, E. Jamin, M. Jugov, N. Heise, T. Forrellat, D. Liparas, L. Wanner, I. Miliaraki, V. Aleksic, K. Simov, A.-M. Soro, M. Eckhoff, T. Wagner, and M. Puigbo. **MULTISENSOR: Development of multimedia content integration technologies for journalism, media monitoring and international exporting decision support**. In *2015 IEEE International Conference on Multimedia & Expo*, 2015.
15. **I. Arapakis**, X. Bai, and B. Barla Cambazoglu. **A Controlled User Study on Human Perception of Web Search Latency**. In *TechPulse* (Internal Yahoo conference), 2014.
16. **I. Arapakis**, B. Barla Cambazoglu, and M. Lalmas. **On the Feasibility of Predicting News Popularity at Cold Start**. In *Proceedings of the 6th International Conference on Social Informatics*, pp. 290-299, 2014.
17. **I. Arapakis**, X. Bai, and B. Barla Cambazoglu. **Impact of Response Latency on User Behavior in Web Search**. In *Proceedings of the 37th International ACM SIGIR Conference on Research and Development in Information Retrieval*, pp. 103-112, 2014.
18. **I. Arapakis**, M. Lalmas, and G. Valkanas. **Understanding Within-Content Engagement through Pattern Analysis of Mouse Gestures**. In *Proceedings of the 23rd International Conference on Information and Knowledge Management*, pp. 1439-1448, 2014.
19. H. Ceylan, **I. Arapakis**, P. Donmez, M. Lalmas. **Automatically Embedding Newsworthy Links to Articles**. In *Proceedings of the 21st ACM International Conference on Information and Knowledge Management*, pp. 1502-1506, 2012.
20. **I. Arapakis**, K. Athanasakos, and J. M. Jose. **A comparison of general vs personalised affective models for the prediction of topical relevance**. In *Proceeding of the 33rd International ACM SIGIR Conference on Research and Development in Information Retrieval*, pp. 371-378, 2010.
21. **I. Arapakis**, I. Konstas, and J. M. Jose. **Using facial expressions and peripheral physiological signals as implicit indicators of topical relevance**. In *Proceedings of the Seventeen ACM International Conference on Multimedia*, pp. 461- 470, 2009.
22. **I. Arapakis**, I. Konstas, J. M. Jose, and I. Kompatsiaris. **Modeling facial expressions and peripheral physiological signals to predict topical relevance**. In *Proceedings of the 32nd International ACM SIGIR Conference on Research and Development in Information Retrieval*, pp. 728-729, 2009.
23. **I. Arapakis**, Y. Moshfeghi, H. Joho, R. Ren, D. Hannah, and J. M. Jose. **Enriching user profiling with affective features for the improvement of a multimodal recommender system**. In *Proceeding of the ACM International Conference on Image and Video Retrieval*, pp. 1-8, 2009.
24. **I. Arapakis**, Y. Moshfeghi, H. Joho, R. Ren, D. Hannah, and J. M. Jose. **Integrating facial expressions into user profiling for the improvement of a multimodal recommender system**. In *Proceedings of the 2009 IEEE International Conference on Multimedia and Expo*, pp. 1440-1443, 2009.
25. **I. Arapakis**, J. M. Jose, and P. D. Gray. **Affective feedback: an investigation into the role of emotions in the information seeking process**. In *Proceedings of the 31st Annual International ACM SIGIR Conference on Research and Development in Information Retrieval*, pp. 395-402, 2008.

Teaching Experience

2016 **Universitat Pompeu Fabra, Graduate School of Economics** Barcelona, Spain
Professor at Master's Degree in Data Science: Data Science Program

- Data Visualization: the course deals with the visualization of large data sets as a means of communicating relevant data patterns aims in the form of graphical displays, in order to interpret and understand the data

2012–2016 **Universitat Pompeu Fabra** Barcelona, Spain
Interviewee for Digital Master of Science in Digital Information with a specialisation in Search Engines

- Provided a written interview that discusses the state-of-the-art in user engagement and the emerging research problems
- Interacted with the M.Sc. students through an online, distance-based learning environment
- Supported the students in their written assignment and provided expert feedback

2007–2008 **University of Glasgow** Glasgow, United Kingdom
Level 2 Tutor and Degree Exam Marker
Responsible for tutoring the following modules in CS undergraduate studies:

- Java Programming 2 (second year)
- Object-Oriented Software Engineering 2 (second year)
- Algorithms and Data Structures 2 (second year)

Supervision Experience

2014–Present **School of Information & Library Science, University of North Carolina** USA
Member of the Ph.D. committee of Ph.D. candidate Ashlee Edwards

Interns

- David Warnock (University of Glasgow, School of Computing Science), 2012
- Ahmet Iscen (Department of Computer Engineering, Bilkent University), 2014
- Ilker Sarac (Department of Computer Engineering, Bilkent University), 2014
- Shatlyk Ashyralyev (Department of Computer Engineering, Bilkent University), 2014
- Giwrgos Hompis (Computer Science Department, University Of Crete), 2015
- Filipa Peleja (Universidade Nova de Lisboa), 2015

Editorial Activities

- Reviewer for Information Processing & Management International Journal (2008 - to date)
- Reviewer for IEEE Transactions on Multimedia Journal (2009 - to date)
- Reviewer for Journal of the Association for Information Science and Technology (2011 - to date)
- Reviewer for IEEE Internet Computing Journal (2012 - to date)
- Reviewer for Computers in Biology and Medicine Journal (2013 - to date)
- Reviewer for Frontiers Journal (2013 - to date)
- Reviewer for IEEE Transactions on Knowledge and Data Engineering (2015 - to date)
- Reviewer for SCIENCE CHINA Information Sciences (2015 - to date)
- Reviewer for Journal of Personalization Research (2016 - to date)

Program Committee Memberships

- WWW 2016
- ICDM 2016 (Sponsorship Chair)
- ICPRAM 2016-2017
- ACM SIGIR 2014-2016
- ACM CIKM 2015
- ACM EMNLP 2015
- ASE/IEEE SocialCom 2012
- ICMCCA 2012
- Workshop on Neuro-Physiological Research in Information Retrieval, SIGIR 2015
- Workshop on Emotions and Personality in Personalized Services, UMAP 2013-2016
- Workshop ”On the Role of Engagement in Human Information Interaction: From Research to Implementation” for iConference 2015
- International Workshop on Multimodal Media Data Analytics, ECAI 2016

Invited Talks

- “**User Behaviour Modelling: Online and Offline Methods, Metrics, and Challenges**”, Keynote speaker at 1st International Workshop on System And User Centered Evaluation Approaches in Interactive Information Retrieval, CHIIR 2016, Chapel Hill, Carolina, USA, March 17, 2016.
- “**User Behaviour Modelling: Online and Offline Methods, Metrics, and Challenges**”, Telefonica Research, Barcelona, Spain, January 21, 2016.

- "**Conscious and Unconscious Effects of Search Latency on User Behavior in Web Search**", Microsoft STC-E, Munich, Germany, June 17, 2015.
- "**User Engagement in Web Search: Response Latency, Engagement Metrics, and Scalability**", iConference 2015 Workshop, Newport Beach, California, US, March 24, 2015.
- "**System and User Aspects of Web Search Latency**", Universitat Pompeu Fabra, Department of Economics and Business, Barcelona, Spain, February 10, 2015.
- "**A Controlled User Study on Human Perception of Web Search Latency**", TechPulse 2014 (Internal Yahoo Conference), Santa Clara, CA, US, December 9, 2014.
- "**Impact of Response Latency on User Behavior in Web Search**", Telefonica Research, Barcelona, Spain, October 20, 2014.
- "**User Engagement in Online News: Under the Scope of Sentiment, Interest, Affect, and Gaze**", Universitat Pompeu Fabra, IDEC, Barcelona, Spain, February 4, 2014.
- "**The Face of Interest or the Face of Indifference? Predicting Topical Relevance Using Real-Time Facial Expression Analysis**", Polytechnic University of Valencia, Spain, February 1, 2013.
- "**Predicting News Popularity in Online Communities**", Yahoo Labs Winter Science Week, Sunnyvale, CA, US, March 7, 2013.
- "**Affective Feedback: What do user emotions tell us about topical relevance?**", Dublin City University, Dublin, Ireland, June 5, 2009.
- "**Affective Feedback: An Investigation into the Role of Emotions in the Information Seeking Process**", Centre for Research & Technology (ITI), Thessaloniki, Greece, September 1, 2008.

Languages

- **Greek:** Listening (C2), Reading (C2), Speaking (C2), Writing (C2)
- **English:** Listening (C2), Reading (C2), Speaking (C2), Writing (C2)
- **Spanish:** Listening (B1), Reading (B1), Speaking (B1), Writing (B1)

References

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