UMAP 2022

Proceedings of the

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UMAP 2022 Chairs' Welcome

ACM UMAP – User Modeling, Adaptation and Personalization – is the premier international conference for researchers and practitioners working on systems that adapt to individual users or to groups of users, and that collect, represent, and model user information. ACM UMAP is sponsored by ACM SIGCHI and SIGWEB, and organized with User Modeling Inc. UMAP is the successor of the biennial User Modeling (UM) and Adaptive Hypermedia and Adaptive Web-based Systems (AH) conferences that were merged in 2009.

For the first time in the history of the conference, ACM UMAP 2022 ran in **hybrid mode**, with the opportunity for speakers and attendees to participate onsite or online, hosted at the University Pompeu Fabra, Spain. The conference runs over 4 days, with the classic tracks that characterize it, spanning from papers, workshops, tutorials, late breaking results, and a Doctoral Consortium. With the help of our Local chairs (Cristian Consonni and Mihnea Tufiș) and Streaming & Broadcasting chairs (Walter Anelli, Lesly Miculicich, Lorena Recalde, and Mete Sertkan) this new format was developed in a manageable way to offer a rich attendance to both online and onsite participants.

In addition, this year we are celebrating the **30th anniversary of UMAP**. Since no celebration can be done alone, ACM UMAP 2022 is co-located with ACM WebSci 2022 and ACM Hypertext 2022, both happening in Barcelona a few days before the conference.

To celebrate this anniversary, new topics enriched our main track: "virtual assistants and human-robot interaction" and "research methods and reproducibility." New this year was the fact that the personalized recommender systems track was cross-listed with the ACM Hypertext conference, and the track chairs did an excellent job of coordinating the review processes across the two conferences. Moreover, to mark the 30th anniversary of the UMAP conference, we organized the Theory, Opinion and Reflection track to reflect on qualitative and quantitative analyses while welcoming blue-sky and innovative ideas, with two accepted papers being presented in the conference.

ACM UMAP covers a wide variety of research areas where personalization and adaptation may be applied. This includes a number of domains in which researchers are engendering significant innovations based on advances in the areas of user modeling and adaptation, recommender systems, adaptive educational systems, intelligent user interfaces, e-commerce, advertising, digital humanities, social networks, personalized health, entertainment, and many more.

This year's conference was organized according to the following eight tracks and track chairs: Personalized Recommender Systems (Osnat 'Ossi' Mokryn, Eva Zangerle, and Markus Zanker), Adaptive Hypermedia, Semantic, and Social Web (Alexandra I. Cristea and Peter Brusilovsky), Intelligent User Interfaces (Elisabeth Lex and Marko Tkalcic), Technology-Enhanced Adaptive Learning (Judy Kay and Sharon Hsiao), Fairness, Transparency, Accountability, and Privacy (Bamshad Mobasher and Munindar P. Singh), Personalization for Persuasive and Behavior Change Systems (Julita Vassileva and Panagiotis Germanakos), Virtual Assistants and Personalized Human-robot Interaction (Radhika Garg and Cristina Gena), and Research Methods and Reproducibility (Odd Erik Gundersen and Dietmar Jannach).

Moreover, the conference featured a Late Breaking Results and Demo track, chaired by Veronika Bogina and Cataldo Musto, where research-in-progress containing original and unpublished accounts of innovative research ideas were encouraged, together with demonstrations that showcase implementations valuable for the community. In addition, there was a call to receive Doctoral Consortium submissions from graduate students, aiming to receive constructive

feedback and advice from experienced scholars in the community; this track was chaired by Rita Orji and Giovanni Stilo.

These calls for papers attracted numerous submissions that the program committee reviewed and accepted, resulting in the following statistics:

Track	*Reviewed*	*Accepted*	
Technical Papers	115	29	25%
Late Breaking Results and Demos	27	16	59%
Doctoral Consortium	13	9	69%
TOR	2	2	100%

Each submitted paper was reviewed by 3 or more reviewers and evaluated by the corresponding track chairs. It should be noted that this was the first year where short and full papers were not distinguished as part of the technical track of the conference. Valid submissions came from a total of 761 authors from 41 countries. We are thankful to all of these authors for choosing to submit to ACM UMAP 2022 and we thank the program committees for their diligence. Special mention deserve our Proceedings chairs (Noemi Mauro and Paul Taele) for managing all these submissions directly with ACM for the first time in this conference and through a transition to a new publication system, to generate two ACM volumes.

The ACM UMAP 2022 keynotes were special highlights of the conference program. These valuable and insightful talks can and will guide us to a better understanding of the future. Our three keynotes were:

- *"Human-Centered AI: Ensuring Human Control While Increasing Automation"* by Ben Shneiderman, Emeritus Distinguished University Professor in the Department of Computer Science & Human-Computer Interaction Lab, University of Maryland.
- *"Human Behavioral Data to help fight COVID-19"* by Nuria Oliver, Cofounder and Director of the ELLIS Unit Alicante Foundation.
- *"Recommender Systems for Better Human Choices"* by Francesco Ricci, a Full Professor at the Faculty of Computer Science, Free University of Bozen–Bolzano.

A set of 7 workshops and 3 tutorials rounded off the program. These were selected by our Workshop and Tutorial chairs, Mirko Marras and Elvira Popescu:

- (Workshop) APPS: 4th International Workshop on Adaptive and Personalized Privacy and Security
- (Workshop) cAESAR: 3rd International Workshop on Adapted intEraction with SociAl Robots
- (Workshop) ExUM: 1st International Workshop on Explainable User Modeling and Personalized Systems
- (Workshop) FairUMAP: 5th International Workshop on Fairness in User Modeling, Adaptation and Personalization
- (Workshop) GMAP: 1st International Workshop on Group Modeling, Adaptation and Personalization
- (Workshop) HAAPIE: 7th International Workshop on Human Aspects in Adaptive and Personalized Interactive Environments

- (Workshop) PATCH: 13th International Workshop on Personalized Access to Cultural Heritage – Towards Hybrid CH Experience
- (Tutorial) Ethical Considerations in User Modeling and Personalization (ECUMAP), by Jim Torresen and Atsushi Nakazawa
- (Tutorial) Semantics-aware Content Representations for Reproducible Recommender Systems (SCoRe), by Pasquale Lops, Cataldo Musto and Marco Polignano
- (Tutorial) User Control in Adaptive Information Access (UCAIA), by Peter Brusilovsky

Taking advantage of the hybrid format, and with a spirit of widening the UMAP community, we have paid special attention to different forms of support to attend the conference. First, to celebrate the co-location of three ACM conferences in Barcelona, we offered various discounted joint registration fees, either for virtual or in-person participation. Then, we provided discounted or free registration to those who need it, all of this thanks to our sponsors and Student Support chairs (Yong Zheng and Francesco Fabbri) who organized all the received requests and applied for additional funding when needed. All these actions and others were supervised and encouraged by our Justice, Equity, Diversity and Inclusion chairs (Julia Neidhardt and Sole Pera).

We would like to thank all who volunteered to make this conference a success, since putting together ACM UMAP 2022 was a team effort. We first thank the various chairs who spent a large amount of time managing the various tasks at hand—special mention for our Publicity and Web chairs Nasim Sonboli and Helma Torkamaan. Secondly, we thank the authors for providing the content of the program. The track chairs facilitated the review process and together with the program committee ensured a universally high quality of reviews and discussions. As in previous years, we also officially recognized Best Paper and James Chen Best Student Paper awards (sponsored by Springer publishers and User Modeling Inc. respectively) and exceptional reviewers with Best Reviewer awards. Last, but not least, we would like to thank our sponsors and supporters—ACM, SIGCHI, SIGWEB, NSF, User Modeling Inc, Springer, Universidad Nacional de Educación a Distancia (UNED), Universidad Autónoma de Madrid, University of Cagliari, now Publishers, and the UM Board—for their great support, which was needed to conduct this edition of the conference appropriately and successfully. They made possible, among other things, fair access funding and student support.

We hope that you will find this program interesting and thought-provoking, and that the conference program and proceedings provide you with a valuable opportunity to share ideas with other researchers and practitioners from institutions around the world. On behalf of all chairs: Thank you for your interest and support!

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Keynotes

Human-Centered AI: Ensuring Human Control While Increasing Automation

Keynote

Ben Shneiderman

Abstract

A new synthesis is emerging that integrates AI technologies with Human-Computer Interaction to produce Human-Centered AI (HCAI). Advocates of this new synthesis seek to amplify, augment, and enhance human abilities, so as to empower people, build their self-efficacy, support creativity, recognize responsibility, and promote social connections. Researchers, developers, business leaders, policy makers and others are expanding the technology-centered scope of Artificial Intelligence (AI) to include Human-Centered AI (HCAI) ways of thinking. This expansion from an algorithm-focused view to embrace a human-centered perspective, can shape the future of technology so as to better serve human needs. Educators, designers, software engineers, product managers, evaluators, and government agency staffers can build on AI-driven technologies to design products and services that make life better for the users. These human-centered products and services will enable people to better care for each other, build sustainable communities, and restore the environment. The passionate advocates of HCAI are devoted to furthering human values, rights, justice, and dignity, by building reliable, safe, and trustworthy systems. The talk will include examples, references to further work, and discussion time for questions. These ideas are drawn from Ben Shneiderman's new book Human-Centered AI (Oxford University Press, February 2022). Further information at: https://hcil.umd.edu/human-centered-ai

Bio

Ben Shneiderman (http://www.cs.umd.edu/ben) is an Emeritus Distinguished University Professor in the Department of Computer Science, Founding Director (1983-2000) of the Human-Computer Interaction Laboratory (http://hcil.umd.edu), and a Member of the UM Institute for Advanced Computer Studies (UMIACS) at the University of Maryland. He is a Fellow of the AAAS, ACM, IEEE, NAI, and the Visualization Academy and a Member of the U.S. National Academy of Engineering. He has received six honorary doctorates in recognition of his pioneering contributions to human-computer interaction and information visualization. His widely-used contributions include the clickable highlighted web-links, high-precision touchscreen keyboards for mobile devices, and tagging for photos. Shneiderman's information visualization innovations include dynamic query sliders for Spotfire, development of treemaps for viewing hierarchical data, novel network visualizations for NodeXL, and event sequence analysis for electronic health records.

Ben is the lead author of Designing the User Interface: Strategies for Effective Human-Computer Interaction (6th ed., 2016). He co-authored Readings in Information Visualization: Using Vision to Think (1999) and Analyzing Social Media Networks with NodeXL (2nd edition, 2019). His book Leonardo's Laptop (MIT Press) won the IEEE book award for Distinguished Literary Contribution. The New ABCs of Research: Achieving Breakthrough Collaborations (Oxford, 2016) describes how research can produce higher impacts. His new book on Human-Centered AI[1], was published by Oxford University Press in February 2022.

[1] https://global.oup.com/academic/product/human-centered-ai-9780192845290

Human Behavioral Data to help fight COVID-19

Keynote

Nuria Oliver

Abstract

The spread of infectious diseases that are transmitted from human to human largely depends on human behavior. Hence, modeling, understanding and predicting human behavior during a pandemic is of paramount importance. In my talk, I will describe the work that I did between March 2020 and March 2022, leading a multidisciplinary team of 20+ volunteer scientists working very closely with the Presidency of the Valencian Government in Spain on 4 large areas at the intersection of human behavior, data and pandemics:

1. large-scale human mobility modeling;
2. computational epidemiological models (both metapopulation, individual and LSTM-based models);
3. predictive models; and
4. a large-scale, online citizen survey called the COVID19 impact survey with over 720,000 answers worldwide. This survey has enabled us to shed light on the impact that the pandemic is having on people's lives.

I will present the results obtained in each of these four areas, including winning the 500K XPRIZE Pandemic Response Challenge and obtaining a best paper award at ECML-PKDD 2021. I will share the lessons learned in this very special initiative of collaboration between the civil society at large (through the survey), the scientific community (through the Expert Group) and a public administration (through the Commissioner at the Presidency level). For those interested in knowing more, WIRED magazine published an extensive article describing our story: https://www.wired.co.uk/article/valencia-ai-covid-data.

Acknowledgments: My talk describes the work of over 20 scientists from the Data Science against COVID-19 taskforce, including researchers from the University of Alicante, the University Miguel Hernández, the Polytechnic University of Valencia, the University Jaume I, the CEU Cardenal Herrera University and FISABIO. The work has been partially funded by grants FONDOS SUPERA COVID-19 Santander-CRUE, 2020-2021, Fundación BBVA to scientific research teams SARS-CoV-2 COVID-19, IA4COVID19 2020-2022 and the Valencian Government via their Science, Innovation and Digital Society Ministry.

Bio

Nuria Oliver is Cofounder and Vicepresident of ELLIS (The European Laboratory for Learning and Intelligent Systems), cofounder and Director of the Institute of Human(ity)-centric AI (ELLIS Unit Alicante), Chief Data Scientist at Data-Pop Alliance and Chief Scientific Advisor to the Vodafone Institute. She earned her PhD from MIT. She is a Fellow of the ACM, IEEE and EurAI at the same time. She is an elect member at the Royal Academy of Engineering and the only Spanish scientist at SIGCHI Academy.

She has over 25 years of research experience in human-centric AI and is the author of over 180 widely cited scientific articles as well as an inventor of 40+ patents and a public speaker. She has authored the book "Artificial Intelligence, naturally", in collaboration with the Spanish Ministry of Economy and Digital Society. Her work is regularly featured in the media and has received numerous recognitions, including the Spanish National Computer Science Award, the MIT TR100 (today TR35), Young Innovator Award (first Spanish scientist to receive this award); the Digital European Woman of the Year Award; the Spanish Telecommunications Engineer of the Year award; the 2021 King Jaume I award in New Technologies and the 2021 Abie Technology Leadership Award.

In March of 2020, she was appointed Commissioner to the President of the Valencian Government on AI Strategy and Data Science against COVID-19. In that role, she has recently co-led ValenciaIA4COVID, the winning team of the 500k XPRIZE Pandemic Response Challenge. Their work was featured in WIRED, Politico and MSNBC, among other media.

Recommender Systems for Better Human Choices

Keynote

Francesco Ricci

Abstract

Recommender systems have been introduced as autonomous, and perhaps "dangerous," algorithms that can predict their users' preferences and generate recommendations for items that are actually useful for them. Therefore, a large part of the academic and industrial research has initially focussed on the problem of predicting the "true" users' preferences. This approach has been surely influenced by the long tradition of research on user modelling and adaptation. However, in the last 10 years we have understood that giving to the users, by means of an RS, what they really want, is a simplistic reduction of the recommendation task. Hence, new goals and roles of RSs have been considered and among them we can note those deriving from the multistakeholder and multi-criteria nature of most of the recommendation scenarios. As a consequence of this analysis, the problem of generating useful recommendations was understood as not even simple to define, and clearly much more difficult to solve. In this talk I will reflect on some of the foundational problems of the research on RSs and indicate some promising lines of exploration that I have tried to address with my research group.

Bio

Francesco Ricci is a full Professor at the Faculty of Computer Science, Free University of Bozen–Bolzano. He has there established a reference point for the research on recommender systems. He has been active with this community as President of the Steering Committee of the ACM Conference on Recommender Systems, from 2007 to 2010. He was previously a Senior Researcher and the Technical Director of the E-commerce and Tourism Research Lab (eCTRL), ITC-IRST, Trento, Italy, from 2000 to 2006. From 1998 to 2000, he was a System Architect with the Research and Technology Department (process and reuse technologies), Sodalia S.p.A. His research interests include recommender systems, user modeling, machine learning and ICT applications to travel and tourism. He is the author of more than two-hundred refereed publications. According to Google Scholar, he has an H-index of 58 and around 23,000 citations. He is the Co-Editor of the Recommender Systems Handbook (Springer 2022).

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