

2017



Intelligent Systems Program

Newsletter

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Director's Address



Diane Litman
Professor, Department of
Computer Science,

Senior Scientist, Learning
Research and Development
Center

Director, Intelligent Systems
Program,

University of Pittsburgh



Gregory Cooper
Vice Chairman and Professor,
Department of Biomedical
Informatics,

Former Director, Intelligent
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A Brief History of the Intelligent Systems Program

For 30 years, the Intelligent Systems Program (ISP) has been a highly successful and well regarded interdisciplinary artificial intelligence (AI) graduate degree-granting program at the University of Pittsburgh. The main goals of the program are to foster interdisciplinary and transdisciplinary AI across a wide variety of domains in a manner that is informed by the problems within those domains and that contributes to their solution. It is based on the idea that solving difficult, important, real problems in specific fields of study (domains) is a key way to achieve fundamental advances in AI. The ISP faculty have primary appointments in a variety of schools and departments across the University, with the 2017-2018 faculty representing Biomedical Informatics, Computer Science, Informatics and Networked Systems, Law, Psychology, Education, and Engineering. This variety provides a rich diversity of domains and problems to address using AI methods.

The ISP was established in 1986 and the first students enrolled in 1987. Until this semester, ISP had been administratively housed within the School of Arts and Sciences (A&S). The Director of the ISP reported to the Dean of A&S, and the graduate students received their degrees from A&S. Over the past three decades, ISP Directors have included Drs. Alan Lesgold, Richmond Thomason, Kevin Ashley, Kurt VanLehn, Johanna Moore, Martha Pollock, Bruce Buchanan, Janyce Wiebe, Greg Cooper, and Diane Litman, who is the current Director. The ISP now has over 85 graduates with approximately 75% of them obtaining doctoral degrees. Over 20 of the graduates are university faculty, including those with appointments at Boston University, Carnegie Mellon University, City University of New York, Florida International University, NC State University, Texas A&M University, University of Albany, University of British Columbia, University of Crete, University of Florida, University of Minnesota, University of New Mexico, University of Pennsylvania, University of Pittsburgh, University of Utah, and Al Akhawayn University. About 25 are research scientists or engineers at technology companies such as Adobe Research, Apple, Bloomberg, Magic Leap, Microsoft, and Google. Several graduates are working in health informatics within health systems, including a graduate who is the Medical Director for Clinical Decision Support and Reporting at UPMC.

Effective this term, the ISP will be housed within the new School of Computing and Information (SCI). SCI was established July 1, 2017, with Paul Cohen (a Fellow of the Association for the Advancement of Artificial Intelligence) as the founding Dean. SCI is a natural home for the ISP. Both have a multidisciplinary and transdisciplinary focus, understand the important

Director's Address

interplay between theory and practice in advancing science, and are dedicated to developing and applying new computational methods to derive knowledge from data and apply that knowledge to improve decisions and outcomes. Moreover, some of the most active faculty in the ISP have primary appointments in the Department of Computer Science and the former School of Information Science, both of which are now housed in SCI.

To celebrate both our illustrious past and our promising future, we are planning an ISP 30th Anniversary conference and gala dinner on Friday March 16, 2018. We hope you will be able to return to Pittsburgh and join us! We are also privileged that ISP's first three program directors were able to contribute content for this newsletter. Their reflections in the pages that follow contain a wealth of fascinating information about the early years of ISP.

ISP: Celebrating 30 Years

Reflections on Thirty Years of the Intelligent Systems Program: Long-term Bets on the Future



Alan Lesgold
Renée and Richard Goldman
Dean Emeritus,

Professor Emeritus of
Education, Psychology, and
Intelligent Systems

Founding Co-Director,
Intelligent Systems Program

University of Pittsburgh

My own career seems to have involved a lot of work done around 25-30 years before the work became popular. I see this most clearly in the resurgence of interest in the applications of artificial intelligence to coached apprenticeship as an approach to training technicians to tackle emergent system failures in complex technical jobs, where work I did between 1984 and 1998 is suddenly being used as a guide to development of additional training systems. In many respects, the origin of the Intelligent Systems Program also was a long-term investment. With a strong history, it also is well positioned to continue to be a great example of multidisciplinary research and doctoral preparation. With a generational turnover well along, a bit of its history needs to be recorded.

About 33 years ago, several of us at Pitt began discussing our interests in doing research that leveraged the artificial intelligence techniques just starting to be used and refined. At the time, Harry Pople was working with Jack Myers on a program called Internist that was meant to intelligently diagnose illnesses within the scope of internal medicine. Jim Greeno and I were starting to think about rule-based simulations of various cognitive activities, and Profs. Myers and Pople arranged for us to get a connection to Arpanet through CMU – this is why my email address of al@pitt.edu predates Pitt having an Internet connection – CMU wanted the folks at Pitt to be labeled differently from their own people lest our sins reflect poorly on their institution. Over the course of a year or two, others got involved, including John Vries and Gordon Banks in Neurology, Rich Thomason in Philosophy, and Jerry May in Business. All of us had the same problem, which was that Pitt was invisible to the kinds of students we needed who could quickly acquire new formal reasoning and analytic skills.

Things would have moved more slowly except that Tom Detre, senior vice chancellor for the health sciences and dean of the medical school, was beginning to have the hunch that artificial intelligence would become important to medicine, one of many prescient hunches that Tom had over his time at Pitt. Eventually, Rich Thomason and I took on the task of creating a formal proposal for the Intelligent Systems Program, with a lot of input from other interested colleagues. As the proposal evolved, the Center for Biomedical Informatics was also taking shape, and several of its faculty, Greg Cooper and others, began doing work broadly in the realm of intelligent systems. So, there was a critical mass across the University that could assure that a doctoral program that leveraged cognitive science and computer science could prepare strong students and could develop more rapidly by attracting students with preparation in the formal sciences.

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As the proposal was shaping up, two people emerged as godfathers for ISP. Tom Detre certainly was one, and he certainly was a source of great encouragement during a period where multiple turnovers of the Provost role at Pitt made forward movement on the proposal somewhat frustrating. Tom, in many ways, convinced me that the best way to have an Intelligent Systems Program given the bureaucratic quagmire was to simply start building it, and so Rich and I did just that, with Tom assuring that we would survive any fallout from moving quickly.

The other godfather was Allen Newell, who was my source for advice on how to configure the program. Allen was always available for discussions in person, by phone, and by email. The most important of these discussions took place one Sunday night, from about 10pm until perhaps 1 or 2 am, in his office at CMU. My model for faculty development was to try hard to find several bright young assistant professors, give them some support to build their research, and then build upon as many of them as ended up developing strong research programs. Allen convinced me, after extended resistance on my part, that we needed to recruit at least one senior person who was centrally in the world of artificial intelligence, both to mentor younger faculty and to attract them in the first place. He was, of course, completely correct in his view.

We had the incredibly good fortune of recruiting Bruce Buchanan to Pitt, and he was the first person to be recruited. I'm sure that people like Kurt VanLehn, Johanna Moore, Kevin Ashley and others paid more attention to our recruiting efforts because Bruce was with us. Bruce was, in many ways, the perfect person to be the scholarly leader for ISP, and many of our early students benefited from his mentoring and learned from his example as a strong professor.

Bruce also did one technical thing for ISP that was very important to its early success. The first question everyone raised about ISP was whether its graduates could be employable in the academic world, given that there were extremely few freestanding programs like ISP to hire them. Bruce worked very hard to bring the ISP master's requirements into alignment with those of Computer Science, so that a student could always move from ISP to CS if the job issue became a concern and, especially later, so that students starting in CS could shift over to ISP if their interests developed in that direction. It's not clear that this linkage was used very much, but it was important. We were asking really promising students to take a chance on ISP at Pitt, and having an insurance backup made it a lot easier and more rational for them to do so.

We also were asking disciplinary departments to take a chance on ISP, especially when a scholar was targeted by us rather than by a departmental search committee. Two hires illustrate the role that university leaders played in getting ISP started. Making a senior hire at the beginning was especially hard. It only worked because Tom Detre initially offered to cover Bruce's salary. Even then, the Computer Science Department was worried about having a colleague working in an area that was not, at the time, part of their focus and, even worse, was being paid by the health sciences. In the end, they were only willing to vote to recommend Bruce's appointment if his salary was entirely in Arts and Sciences. At this point, Dean Peter Koehler stepped up and made that possible. And, of course, the appointment was

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good for CS in multiple ways.

Similarly, when ISP was interested in hiring Kevin Ashley, there was some resistance. While his degree was in CS, he had worked thereafter only in a law firm. Provost Rudy Weingartner stepped in and worked with Dean Mark Nordenberg in the School of Law to develop a position there. Again, the risk taken by Rudy, Mark, and the Law faculty turned out to be a good investment. Kevin quickly became known as a strong law teacher, and he continues to be a leader in bringing external sponsorship of his strong research into law at Pitt.

Overall, in terms of the quality of research done by ISP faculty and the quality of doctorates produced, ISP has been a huge success. Like some of Pitt's multidisciplinary efforts, it may have started a bit earlier than was prudent, but it has served Pitt well. It continues to have strong students on both its health sciences side and its arts and sciences side, and I certainly am proud of the work that Rich Thomason and I did and thankful for all the support from Allen Newell and Tom Detre. Many of the folks who played leadership roles at the start are no longer in such roles. Rich is at Michigan; Bruce Buchanan is retired. I became the dean in Education and am now retiring. Our godfathers Tom Detre and Allen Newell have passed away, as have Harry Pople and Jack Myers. Kurt VanLehn and Johanna Moore have moved to other universities. Other members of the initial talent pool still at Pitt, like Kevin Ashley, Greg Cooper, and Diane Litman, are now senior scholars with international reputations.

While I am proud of the work early ISP people did, I am especially pleased that the program continues to be strong. Research foci in universities are a bit like small businesses, and the transition from the first generation to the second often fails. This is not the case for ISP. Throughout its history, ISP has been characterized by the strength of its scholarly work, and that continues. Also throughout its history, its faculty have tended not to see the leadership of ISP as a central part of their identity or aspirational identity. But, people have stepped up to lead the program as needed, and often the strongest organizations are those in which principled and relatively ego-free focus on doing good work is at their core. That certainly continues to be the case for ISP.

ISP: Celebrating 30 Years



Rich Thomason
Professor, Department of
Philosophy, University of
Michigan

Founding Co-Director,
Intelligent Systems Program

A Note by Dr. Rich Thomason on his time at the Intelligent Systems Program

I have always lived pretty much in the present, and dates and episodic details don't have a long half-life in my memory. I could reconstruct more of the early history of ISP at Pitt if I could consult my records from that time, but those are not available at my summer address. So the following will be brief, sketchy, and selective.

ISP began as an initiative of Roger Benjamin's, who was Provost at Pitt from 1983 to 1986. Alan Lesgold and I were the founding co-directors of the program, beginning, I believe, in 1987. By the time the program was launched, Benjamin had departed, and while I was there ISP suffered somewhat from the lack of strong support from an administrator with budgetary authority. Nevertheless, we had office space, starting with just one office in Thackeray hall, later moving into space with room for several offices in the Cathedral of Learning. We had funding for one administrative assistant, a couple of workstation/servers (AI was not done on PCs at the time), as well as a limited amount of graduate student support. This was not increased while I was a co-director. In fact, Alan and I had to fight often and hard to keep it from being reduced -- this was the least pleasant part of my job.

Pitt's strength in AI was scattered around in many different units: Business, Information Science, LRDC, Medicine, and Psychology, as well as Computer Science. And that was expanded to Law when Kevin Ashley was hired shortly after the start of the Program. This created an interdisciplinary model for AI that is much more common in Europe than in the US. From the start, that gave us an edge in attracting good students. Though Computer Science remains the core discipline for AI, I have always thought that the interdisciplinary model is important in a field where it is so difficult to find a clear path to the solution of the fundamental problems.

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My own AI-related research during this time shifted from collaborative work with colleagues at CMU in information retrieval and logical AI to research on computational dialog at Pitt with students in ISP and Johanna Moore, who had been hired by Computer Science.

Working with students like Vincent Alevan, John Aronis, Giuseppe Carenini, Steve Casner, Violetta Cavalli-Sforza, Cristina Conati, Pam Jordan, Bruce McLeren, Stefano Monti, Michael Wagner, and Michael Young was a great pleasure. This list of names shows how fortunate we were in our early recruiting. And I'm especially grateful to Stefni Agin, who began as my editorial assistant with the Journal of Philosophical Logic and became the first Administrative Assistant for ISP. She had to do almost everything, there was nothing she did not do well, and the Program would not have succeeded without the combination of dedication and good sense she brought to her job.

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Kevin Ashley
Professor, School of Law,
Senior Scientist, Learning
Research and Development
Center
Former Director, Intelligent
Systems Program
University of Pittsburgh

Supporting Multidisciplinary Research Careers at ISP

My experiences with the University of Pittsburgh's Intelligent Systems Program began when I met Professor Rich Thomason, a co-founder of the Program along with Dean Alan Lesgold and its Co-Director from 1987–1994.

I had studied computer science as a graduate student at UMass Amherst after having practiced law for five years on Wall Street. When I obtained my PhD early in 1988, I knew that I wanted to continue my research in applying AI to model legal reasoning in an academic setting. I did not know, however, whether to do so in a computer science department or as part of a law school faculty. That spring, at the invitation of Professor Jaime Carbonell, I delivered a job talk at CMU's School of Computer Science. I never got the job. Then as now AI & Law was regarded as a kind of niche topic. At least, that is how I rationalized the lack of an offer. Fortunately, however, Rich attended my talk at CMU. He saw a future for AI & Law and for me in Pitt's newly formed ISP.

A year later, when I presented a job talk at the University of Pittsburgh School of Law, it was mostly thanks to Rich's persistent efforts. He had campaigned with then Law School Dean Mark Nordenberg for an invitation, and with Alan, he explored the possibility of joint appointments at the Learning Research and Development Center (LRDC) and ISP. When I arrived on campus, we met with Provost Rudy Weingartner on the very last day of his tenure. He had worked with Alan, Rich and Mark to develop the position.

At about that time, I realized the central role ISP would play in my academic life, the role it has played ever since I joined it in 1989: ISP was to be the source of the talented graduate students and PhD advisees with whom I would collaborate in research in AI & Law and in developing educational technology for teaching argumentation skills. It was the genius of Rich and Alan to conceive ISP as a multidisciplinary graduate program at the University of Pittsburgh dedicated to applying artificial intelligence (AI) in many disciplines. A crucial component of that role was to provide homes for junior faculty and aspiring graduate students to pursue their multidisciplinary dreams. When I, a law professor, would apply for grants from funding agencies like the National Science Foundation, it was only by virtue of my ISP association that I could claim access to promising, technologically-oriented students to work with and an academic research

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home, along with LRDC, in which those students could learn and flourish.

Beyond graduate students, ISP provided other necessary ingredients for a successful multidisciplinary graduate program applying AI across disciplines. First, it provided a roster of faculty to serve as dissertation committee members who were not only highly qualified experts in AI and applications, but crucially, open-minded enough to consider and evaluate research that almost always extended, at least in part, beyond any given faculty member's domain of expertise. My students and I have benefitted greatly from the generous service of ISP faculty on dissertation committees, including Professors Peter Brusilovsky, Bruce Buchanan, Marek Druzdzal, Alan Lesgold, Diane Litman, Martha Pollack, Chris Schunn, and Kurt VanLehn. We have all learned valuable lessons not only from their scientific expertise but their experience and wisdom in designing successful PhD dissertations. (Thank you, Bruce Buchanan, for your early focusing my students and me on the signal importance of identifying an interesting scientific hypothesis and seeing an AI program primarily as a vehicle for gathering evidence to evaluate that hypothesis.) Importantly, the ISP faculty's stellar academic credentials as systematic, empirical researchers have gone a long way toward helping hiring committees of other universities to understand and value a PhD degree from this multidisciplinary program.

Over the years, ISP's junior faculty have also benefitted in their own departments from the academic reputation of ISP and its faculty. If it were easy for academic institutions to support multidisciplinary research in topics like AI & Law or AI & Medicine, more institutions would do so. Like their counterparts on the farm, academic silos have smooth walls like steel that do not admit of recesses in which to grow multidisciplinary projects. A notorious stumbling block is the granting of tenure. A junior faculty person in an academic department who pushes the envelope in applying AI technology to his or her domain takes a great risk that departmental colleagues will not understand or appreciate the value of this contribution. The facts that the University of Pittsburgh is located geographically in a city where AI is constantly in focus – just look out the window for an autonomous automobile in training – and that it supports an institutional center for AI research peopled by serious faculty researchers, help faculty colleagues in traditional domains to accept the possibility, indeed the likelihood, that their junior colleagues in ISP are doing good work.

A final necessary ingredient that ISP provides for a successful multidisciplinary program concerns its degree requirements. They are flexible enough to accommodate students who may have special credentials in some domain like law, business, or medicine and who see the potential in applying AI to their domains. This is not always, indeed often is not, true of traditional computer science departments, where a commitment to cross-domain abstraction sometimes dulls an appreciation of the particularities of domain knowledge and processes to which we aspire to apply AI. In the case of my students, the dissertation titles show the scope of the multidisciplinary applications of AI that ISP has made possible in law, ethics, and learning: In "Teaching Case Based Argumentation Through a Model and Examples" Dr. Vincent Alevan developed a program, CATO, that taught skills of argument-making and a model for using case-based arguments to predict legal case outcomes. Dr. Bruce McLaren, in his "Assessing the Relevance of Cases and Principles Using Operationalization Techniques," demonstrated empirically how cases applying ethical principles in engineering ethics fleshed out their meanings in a way that could improve information retrieval. Dr. Ilya Goldin's "A Focus

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on Content: The Use of Rubrics in Peer Review to Guide Students and Instructors,” showed how a data analytic model of a computer-supported peer review process of law students’ writing yielded pedagogically useful information about their understanding of legal concepts and about the relative effectiveness of more and less domain-specific legal writing criteria. Dr. Collin Lynch’s “The Diagnosticity of Argument Diagrams” demonstrated how the quality of students’ argument diagramming and their argumentative writing are linked in pedagogically useful ways. Dr. Matthias Grabmair’s “Modeling Purposive Legal Argumentation and Case Outcome Prediction Using Argument Schemes in the Value Judgment Formalism” revisits the application of case-based arguments to predict outcomes of legal cases and to explain the predictions, taking into account decisions’ effects on underlying legal values.

Incidentally, unlike their dissertation advisor, three of these ISP graduates did succeed in securing academic positions at CMU. Aleven is an Associate Professor of Human-Computer Interaction (HCI), McLaren an Associate Research Professor of HCI, and Grabmair now works as a Systems Scientist in (Professor Jaime Carbonell’s) Language Technologies Institute.

Today, as ISP begins its promising affiliation with the new School for Computing and Information at the University of Pittsburgh, I can only express my deep gratitude to Rich Thomason and Alan Lesgold for the unique academic institution they created in the Intelligent Systems Program, and to my ISP colleagues for not only preserving it for thirty years but making it thrive and grow.

ISP Alumni Highlights

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In this section, we celebrate the personal and professional achievements of the ISP alumni.

ISP Alumni Highlights

An Interview with Dr. Steve Casner



Steve Casner
Author
Research Psychologist,
NASA.

I am happy to introduce our readers to Dr. Steve Casner. Dr. Casner graduated with his PhD from the Intelligent Systems Program in 1990. Since graduation, he has been working at NASA as a research psychologist. Dr. Casner recently released a book titled 'Careful: A User's Guide to Our Injury-Prone Minds'. In the book, Dr. Casner notes a troubling recent increase in accident-related injuries after nearly a century of gradual decline. The book makes us aware of our psychological limitations, in our day-to-day activities, that make us prone to accidents.

Jeya: *Dr. Casner, I want to congratulate you on the book and its excellent reviews so far. Thank you for joining us for this interview.*

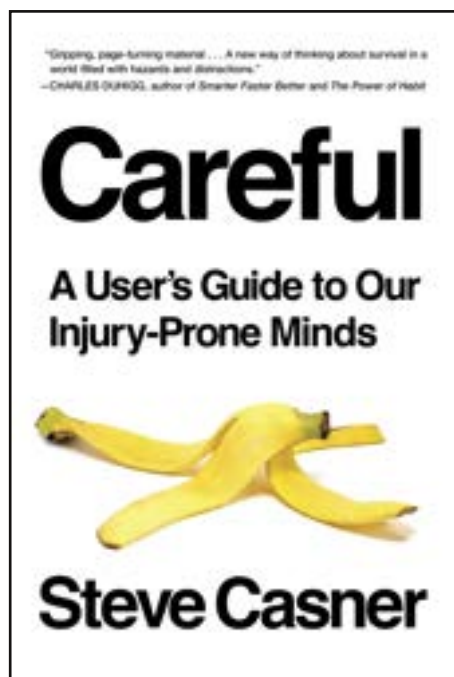
Jeya: *You are among the earliest graduates from the Intelligent Systems Program (ISP). ISP turns 30 this year. Would you share with us, what was your motivation to do graduate studies in Artificial Intelligence with the Intelligent Systems Program?*

Dr. Casner: I visited the University of Pittsburgh for a summer when I was a PhD student in computer science at another university. My biggest frustration with that program was that it afforded me very little flexibility in the classes I took or the scientific interests I pursued. I spent months of my time learning about topics for which I knew I had little interest. Meanwhile, I was hearing about a new program at Pitt in which I was not only allowed to study psychology, cognitive science, medicine, linguistics, and philosophy ... but they actually encouraged it. I could already see that the research I was reading was changing in interdisciplinary ways, and while the rest of the universities were still mulling it over, the ISP was blazing new trails for its students. I quickly applied to the ISP, got accepted, and dropped out of my old program over the phone.

Jeya: *You are a research psychologist at NASA, how did you move from the ISP to NASA? What does your work at NASA entail?*

Dr. Casner: Once again, the key word here is interdisciplinary. The people in the human performance division at NASA seemed astonished that I was familiar with the cognitive science literature, could write code and build computational models, and even knew something about physiology. For NASA's space and aeronautics work, I was made to order. I had to confess that most, if not all, of the students in the ISP are like that.

ISP Alumni Highlights



The book *Careful: A User's Guide to Our Injury-Prone Minds* by Dr. Steve Casner (Click image for Amazon page).

Jeya: *Can you speak about your recent book, Careful? What was your target audience?*

Dr. Casner: This was a very different kind of project for me. The intended audience wasn't scientists, it was everybody else who needs to know what scientists have found out about staying safe in a world where it seems to get more challenging every year. The biggest challenge in writing a book like this is the dismissive attitude so many people have toward safety, and after reading books like *The Darwin Awards* for so many years, think that injuries and fatalities happen to stupid people. I can tell you, I drive right through Silicon Valley most every day among cars driven by some of the smartest people on the planet. How many of these people are staring down at their phones? Too many to count. I saw one person texting on one phone while video chatting on another phone ... both while driving. They might be really smart but they desperately need a "crash" course in how human attention works.

Jeya: *You have been a prolific writer at NASA. How was the transition from writing to a technical audience to a more general audience?*

Dr. Casner: What a transition that was. The New York trade publishing scene is like another world. I spent three months drafting the few chapters of *Careful* and sent to them my editor. Her reaction was "No." I asked her for her detailed comments and she said that those were her detailed comments. "This needs to be an engaging reader experience," she reminded me. I wrote some of those chapters from scratch as many as five times. It was a huge learning experience for me and I hope I get to write another book. After all that pain and suffering over the first book, I almost know what I'm doing now. I think I could be much more efficient next time.

ISP Alumni Highlights

Jeya: *Would you have any advice for the current ISP students, about writing and career in general?*

Dr. Casner: The number of journals and papers published in them has skyrocketed since I was in graduate school back in the 1980s and it all seems to be accelerating. I saw a short article in *Nature* that estimated that global scientific output is now doubling every nine years. So there's a bit of competition out there for the reader's attention. There's no substitute for great tech or empirical data but after you're done developing it, your next job is to let people know that it exists and why it's important. Developing your writing and other communication skills is a great investment in your future. Being able to put across your findings in interesting ways is becoming more and more important. Take a screenwriting class. Join a writers' group (or start up your own). It's all fun stuff and a great way to develop your storytelling skills and your ability to capture peoples' interest. Look at some of the trade books written by top cognitive scientists like Steven Pinker, Dan Gilbert, Daniel Kahneman, Adam Alter, and Maria Konnikova. They're filling the journals with great research by day and dropping trade books right onto the bestsellers lists in their spare time. They've got it figured out.

Jeya: *Thank you, Dr. Steve Casner, for taking time and speaking to us.*

ISP Alumni Highlights



Dr. **Matthias Grabmair** has joined Language Technologies Institute at Carnegie Mellon University as a Systems Scientist. He describes his new role—*"I am joining CMU's Language Technologies Institute as a Systems Scientist to continue my work on AI & Law, question answering, and dialog systems. I also co-teach core courses in the analytics major of CMU's Master's of Computational Data Science program."*

Dr. **Cristina Conati**, since July 2016, is a full professor at the Department of Computer Science, University of British Columbia.



Dr. **Bruce McLaren** is now an Associate Research Professor at the Human-Computer Interaction Institute, Carnegie Mellon University. He was recently voted as the president of the International Society of AI in Education (AIED society).

Aditya Nemlekar is now a senior research programmar at the National Robotics Engineering Center, Pittsburgh. He describes his role as—*"I work with CMU's NREC Facility to research and implement new Automated Frameworks for ensuring Robot Safety, particularly in Unmanned Autonomous Vehicles (UAV). In addition, I also work on research on Robot Path Planning and Symbolic Language Processing."*



Dr. **R. Michael Young** is now a professor and director at Liquid Narrative Group in the School of Computing, University of Utah. He is also the deputy director of the Entertainment Arts and Engineering program at the university.

ISP Faculty Highlights

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In this section, we celebrate the personal and professional achievements of the ISP faculties.

New ISP Faculty

Nematollah (Kayhan) Batmanghelich



Dr. Kayhan Batmanghelich

Dr. Kayhan Batmanghelich joined the Department of Biomedical Informatics and Intelligent Systems Program as an Assistant Professor in September 2016. He is also an adjunct faculty in the Machine Learning Department at Carnegie Mellon University. He joins us from Computer Science and Artificial Intelligence Lab (CSAIL) in Massachusetts Institute of Technology (MIT). He has worked in Harvard Medical School as a R25 fellow. Dr. Batmanghelich got his PhD in Electrical and System Engineering from University of Pennsylvania (Philadelphia, Pennsylvania).

The research interests of Dr. Batmanghelich lie in the intersection of medical vision, machine learning, and bioinformatics. He develops algorithms to analyze and understand medical images leveraging genetic information and other Electronic Health Records like radiology reports.

Dr. Batmanghelich is the principal investigator of a collaborative study between University of Pittsburgh and the pharmaceutical company Pfizer Inc. “The goal of the study is to develop a statistical model that relates abnormal anatomical variations of brain structure to the underlying genetic markers of the diseases in order to develop an algorithm that explains causal relationships between such heterogeneous data, and to be able to use the method in similar settings for precision medicine”.

Dr. Batmanghelich currently advises two graduate students (Sumedha Singla, CS; Javad Rahimikollu, ISP) and a postdoctorate (Dr. Mingming Gong).

Author: *Jeya Balaji Balasubramanian*

Source(s):

1. Dr. Batmanghelich’s personal website— <https://kayhan.dbmi.pitt.edu/>
2. Pitt News: Pitt, Pfizer Team Up on Health Data Analytics— <http://www.news.pitt.edu/news/pitt-pfizer-team-health-data-analytics>

ISP Faculty Highlights



Drs. **Rebecca Hwa**, **Diane Litman**, and Amanda Godley, were awarded an NSF grant for the project titled: "Development of Human Language Technologies to Improve Disciplinary Writing and Learning through Self-Regulated Revising"

Drs. **Adriana Kovashka**, and **Rebecca Hwa**, were awarded an NSF grant for the project titled: "RI: Small: Modeling Vividness and Symbolism for Decoding Visual Rhetoric"



PAWS lab paper "Fine-Grained Open Learner Models: Complexity Versus Support" led by Julio Guerra received the James Chen Best Student Paper Award at UMAP 2017 conference in Bratislava. The paper was advised by Drs. **Christian Schunn**, and **Peter Brusilovsky**.

Dr. **Peter Brusilovsky**, faculty member of the Intelligent System Program, won the Provost's Award for Excellence in Mentoring.



The project entitled: "We Are Strong! Leveraging Information Technology to Empower Marginalized Communities", by principal investigator Dr. **Rosta Farzan**, was awarded funding by the Office of the Provost.

The NSF awarded Dr. **Ervin Sejdic**, a five-year, \$549,139 award to research on the analysis of swallowing disorders.

Dr. Ervin Sejdic was also a recipient of a grant awarded by The Center for Medical Innovation (CMI) given to six biomedical devices including I-HITS that involves Dr. Sejdic.



ISP Faculty Highlights



Dr. **Diane Litman**, was a featured speaker of IBM Watson AI XPRIZE, Pittsburgh on November 17, 2016.

Dr. Diane Litman was also awarded a grant that included Drs. Richard Correnti, and Lindsay Clare Matsumura, by Institute of Education Sciences (IES) Education Technology for the project, "Response-to-Text Tasks to Assess Students' Use of Evidence and Organization in Writing: Using Natural Language Processing for Scoring Writing and Providing Feedback At-Scale."

Dr. **Marek Druzzel** received a Fulbright grant for teaching and research in Poland for the academic year 2016-17.



Dr. **Yu-Ru Lin** was awarded two research grants from the National Science Foundation (NSF). The first project— "DAPPR: Diffusion Analytics for Public Policy Research" was awarded by NSF's Data Infrastructure Program. The second project— "Collective Sense Making Following a Terrorist Attack: The Immediate and Long-Term Impact on Public Resilience", under the direction of Dr. Lin was awarded by NSF's Infrastructure Management & Extreme Events (IMEE) Program.

Dr. Yu-Ru Lin also co-organized the 4th International Workshop on Social Web for Disaster Management (SWDM'16).

ISP Student Highlights

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In this section, we celebrate the personal and professional achievements of the ISP students.

ISP Student Highlights



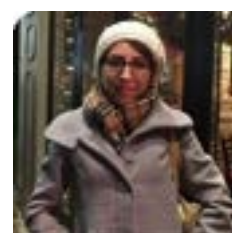
Congratulations to the proud parents **Ye Ye** and **Diyang Xue**, on the birth of their beautiful daughter Jane.



Jeya Balaji Balasubramanian was awarded the 2016 Hattie Becich Award for best teaching assistant by the Department of Biomedical Informatics. He served as a teaching assistant for the course '*Probabilistic Methods in Artificial Intelligence*' for Spring 2016.

Zahra Rahimi was first author of a paper that was shortlisted for an ISCA Best Student Paper Award at the Interspeech 2017 conference:

Zahra Rahimi, Anish Kumar, Diane Litman, Susannah Paletz and Mingzhi Yu, Entrainment in Multi-Party Spoken Dialogues at Multiple Linguistic Levels, Proceedings Interspeech, Stockholm, Sweden, August.



Roya Hosseini was the first author of the paper that was nominated for Best Paper Award at the 2017 Conference on User Modeling, Adaptation and Personalization:

Roya Hosseini, Peter Brusilovsky, Michael Yudelson, and Arto Hellas. "Stereotype Modeling for Problem-Solving Performance Predictions in MOOCs and Traditional Courses." In Proceedings of the 25th Conference on User Modeling, Adaptation and Personalization, pp. 76-84. ACM, 2017.

Mellon Fellows

2017-18

The Andrew Mellon Predoctoral Fellowships are awarded by the Arts & Sciences Graduate Dean's Office, to students with exceptional promise and ability when they have advanced to the dissertation stage.

This academic year, the Mellon fellowships were awarded to three ISP students— Ye Ye, Zahra Rahimi, and Jeya Balaji Balasubramanian.

Mellon Fellows

Transfer Learning for Bayesian Case Detection Systems



Ye Ye
Doctoral Student,
Intelligent Systems
Program,
University of Pittsburgh.

The development of an automated case detection system requires substantial resources, ideally a system developed in one location would perform well in others. We use the term transferability to measure how well a system built in region A performs in region B. Transferability would enable a region experiencing an epidemic of a new pathogen to share its computable case definition with another region where the pathogen may spread next.

My recent research about transferability demonstrated high influenza case detection performance in two large healthcare systems in two geographically separated regions, providing evidentiary support for the use of automated case detection from routinely collected electronic clinical notes in national influenza surveillance.

The Mellon fellowship supports me to further develop transfer learning algorithms to improve the transferability of our system, which is part of my PhD dissertation.



Zahra Rahimi
Doctoral Student,
Intelligent Systems
Program,
University of Pittsburgh.

Entrainment in Multi-Party Spoken Dialogues

Spoken dialogue systems (SDS) have been increasingly used in many different applications. Although SDS can produce understandable and clear speech, it is often perceived as unnatural. Unnaturalness causes even more challenges in multi-party dialogues, for example, collaborative tutoring systems. One of the main characteristics of humans when conversing is linguistic entrainment which is the tendency of interlocutors to become similar to each other during spoken interaction. Entrainment occurs at multiple aspects of speech, including acoustic, phonetic, lexical, and syntactic. It has been shown to be positively correlated with dialogue success, task success, liking, and more in both human-human and human-computer interactions. Therefore, implementing an entraining SDS is important to improve the perception of users from SDS's performance and quality. Analyzing entrainment through computational models is the first-step for implementation of an entraining SDS. Current research on entrainment focuses on conversations between pairs. Team dynamics and properties are much different from pairs. So, there is a need to expand the study to multi-party dialogue.

My research is focused on measuring and analyzing entrainment in multi-party cooperative teams with respect to team dynamics. My goal is to extend this work in several directions. (1) We performed a case-study that showed existing team measures are not able to capture several team properties. I propose to utilize a weighting approach which is derived based on team properties to improve existing measures. (2) Our current measures of entrainment are from the category of global measures that consider the whole or part of the conversation. Defining local measures, which consider dialogue turns, is challenging since the relation of turns are ambiguous in teams (who is talking to whom?). My goal is to extend this work by defining a team-level local entrainment measure which addresses this challenge. (3) I will extend my work by following a second approach for defining entrainment measures. My current approach gives an entrainment value for each linguistic feature. Utilizing unsupervised machine learning methods, such as a Dynamic Bayesian Network, I will measure entrainment without specifying which linguistic features we are targeting. (4) I will explore the ability of the developed entrainment measures to predict team success and dialogue success measures utilizing classification methods.



**Jeya Balaji
Balasubramanian**
Doctoral Student,
Intelligent Systems
Program,
University of Pittsburgh.

An online learning Bayesian Molecular Structural Alert System to detect reactive metabolites from diverse drug candidates

Drug discovery and development cycle involves identification of safe and efficacious drug candidates. Unanticipated drug toxicity and adverse drug reactions cause approximately 40% drug candidates to fail. Drug toxicity is often caused by the formation of electrophilic reactive metabolites that covalently bond to proteins or DNA in the human body. Early detection of possible reactive metabolite formation from a candidate drug is a critical challenge that, if solved, can make the drug development cycle more efficient in terms of drug safety, and significantly reduce the time and money involved in its development. It would also benefit the medicinal chemists if we can explain the reasoning for classifying a drug candidate as potentially reactive and therefore toxic. These explanations should be human-readable and should provide crucial insights to assist chemists in proposing substitutions, additions or rejection of the candidate drug.

Specifically, we propose an online learning Bayesian Molecular Structural Alert System to identify reactive metabolites, from new drug candidates, using the Bayesian Rule Learning (BRL) system and generating human-readable descriptive statistics. The following three aims elucidate our proposed approach— 1) Learn models which, given a new candidate drug molecule and its physical and chemical properties, can predict if the molecule may form a reactive metabolite; 2) Integrate prior knowledge from literature; 3) Implement an online learning framework.

The significance of this project is the development of a fully Bayesian framework that combines quantitative and qualitative knowledge to generate novel ways to visualize human-readable descriptive statistics to assist medicinal chemists. An exciting innovation in BRL system is its ability to combine different mathematical models (like decision trees and neural networks) in a Bayesian setting. To the best of our knowledge, such integration is novel and unique to our group. This system would also be the first solution that proposes an online learning setting that can be deployed in practice. It is our hope that with discussions from experts in medicinal chemistry, we would uncover exciting new knowledge from our visual descriptive statistics.

Thesis Proposals

2016-17

2017-18

At the ISP, PhD degree progress is measured by four milestones— 1) Course requirement completion, 2) PhD preliminary examination, 3) PhD comprehensive examination, and 4) PhD dissertation. Thesis proposals mark the first part of the fourth and final milestone.

In the academic year 2016-17, four ISP students successfully proposed their thesis— Ye Ye, Homa Baradaran Hashemi, Roya Hosseini and Jaromír Šavelka.

Thesis Proposals

Transfer Learning for Bayesian Case Detection Systems



Ye Ye
Doctoral Student,
Intelligent Systems
Program,
University of Pittsburgh.

Traditional machine learning technologies for knowledge discovery from biomedical data usually work under the assumption that the training data (source) and the test data (target) have the same underlying distribution. This assumption is sometimes too strict if the training and test are from different regions/hospitals. The test data could have a different set of features from the training data. Even if the training and test data have a same set of features, the correlation between predictive features and class variable could be different between training data and test data. When applying a model developed with training data to the test data, their differences usually lead to a dramatic performance drop. On the other hand, there is a need to borrow/learn knowledge from other regions, hospitals, or laboratories. Retraining from scratch using target data could be expensive and sometimes infeasible. There may be very few historical data available from target area. Or, there is no adequate labeled target data for supervised machine learning.

This dissertation aims to develop and evaluate a transfer learning framework for Bayesian case detection systems. The framework will be able to provide a smoother transfer of knowledge from the source to the target in two different scenarios: (1) both source data and target data are available, (2) both source model and target data are available. Compared to sharing thousands and millions of raw clinical data, sharing a system/model across institutions' boundary will have much less restrictions and patients' privacy concerns.

Research hypotheses include (1) transfer learning is better than learning from target data only, (2) transfer learning is better than direct adoption of the source model. They will be tested on both synthetic datasets and influenza surveillance datasets.

Committee: Fuchiang Tsui (Advisor), Gregory F. Cooper, Michael M. Wagner, Jeremy C. Weiss.

Thesis Proposals



Homa Baradaran Hashemi
Doctoral Student,
Intelligent Systems
Program,
University of Pittsburgh.

Robust Parsing for Ungrammatical Sentences

Natural Language Processing (NLP) is a research area that specializes in studying computational approaches to human language. However, not all of the natural language sentences are grammatically correct. Sentences that are ungrammatical, awkward, or too casual/colloquial tend to appear in a variety of NLP applications, from product reviews and social media analysis to intelligent language tutors or multilingual processing. In this thesis, we focus on parsing, because it is an essential component of many NLP applications. We investigate in what ways the performances of statistical parsers degrade when dealing with ungrammatical sentences. We also hypothesize that breaking up parse trees from problematic parts prevents NLP applications from degrading due to incorrect syntactic analysis.

A parser is robust if it can overlook problems such as grammar mistakes and produce a parse tree that closely resembles the correct analysis for the intended sentence. We develop a robustness evaluation metric and conduct a series of experiments to compare the performances of state-of-the-art parsers on the ungrammatical sentences. The evaluation results show that ungrammatical sentences present challenges for statistical parsers, because the well-formed syntactic trees they produce may not be appropriate for ungrammatical sentences. We also define a new framework for reviewing the parses of ungrammatical sentences and extracting the coherent parts whose syntactic analyses make sense. We call this task parse tree fragmentation. The experimental results suggest that the proposed overall fragmentation framework is a promising way to handle syntactically unusual sentences.

Committee: Rebecca Hwa (Advisor), Diane Litman, Christian Schunn, Na-Rae Han.

Thesis Proposals



Roya Hosseini
Doctoral Student,
Intelligent Systems
Program,
University of Pittsburgh.

Adaptive Engaging Examples for Computer Science Education

The work in my dissertation is situated in the field of computing education research and, more specifically, the learning and teaching of programming. This is a critical area to be studied, as first, learning to program is hard and, second, the need for programming knowledge and skills is growing, now more than ever. In my dissertation, I am particularly interested in studying how to support the student in constructing programs. Within this context, my dissertation will study the acquisition of program construction skills by worked-out program examples, one of the best practices for acquiring cognitive skills in STEM areas such as mathematics and physics. A worked example provides step-by-step explanations of how a problem is solved. While learning from examples is superior to problem-solving for learners with little domain knowledge, it is not recommended for learners who have acquired sufficient knowledge over time, for whom, more attention should be paid to problem-solving. Thus, it is critical for example-based learning environments to adapt the amount of assistance to student's needs. This important matter has only started to receive attentions in very few STEM areas and it is still unexplored in the programming domain. In fact, in the domain of programming, little attention has been devoted thus far to supporting learning from worked examples. The learning technologies used in programming courses mostly focus on supporting student problem-solving activities and with a few exceptions, examples are mostly absent or presented in a static, non-engaging form. To fill the existing gaps in the area of learning from program examples, my dissertation will explore a new genre of worked-out examples in the field of computer science education that are adaptive and engaging to support students in the acquisition of program construction skills. My research will examine how to personalize practice sequence of students by finding the program that could benefit student the most and then scaffolding the presentation of that program according to the student knowledge – i.e., presenting that as a fully worked out example, a faded example with missing steps that the student needs to complete, or a problem. My dissertation will also include a series of studies to assess the effectiveness of the proposed technologies and, more broadly, to investigate the role of worked-out examples in the process of acquiring programming skills.

Committee: Peter Brusilovsky (Advisor), Christian D. Schunn, Diane Litman, Vincent Alevan.

Thesis Proposals



Jaromír Šavelka
Doctoral Student,
Intelligent Systems
Program,
University of Pittsburgh.

Discovering Sentences for Argumentation about Meaning of Statutory and Regulatory Terms

I propose to study, design, and evaluate computational methods to support interpretation of statutory and regulatory terms. In legal argumentation a lawyer must often defend a specific account of the meaning of one or more terms (i.e., words, phrases). The persuasiveness and validity of a complex argument may hinge on a particular account of the meaning. Argumentation about the meaning of a term may even be the crux of an overall argument. The interpretation involves an investigation of how the term has been referred to, explained, interpreted or applied in the past. This is an important step that enables a lawyer to then construct arguments in support of or against particular interpretations. A response to a search query may consist of hundreds or thousands of documents. Usually most of the sentences that contain the term of interest would be useless and redundancy would be high. In this work I propose to develop methods to retrieve a small set of the most useful sentences automatically. I hypothesize that it is possible to automatically evaluate how useful a sentence is for an interpretation of the term from a specific statutory provision. Furthermore, the information about the usefulness of sentences allows one to select better sentences to be included in the set presented to a user than relying solely on existing state-of-the-art IR and query-focused summarization techniques.

Committee: Kevin D. Ashley (Advisor), Diane Litman, Milos Hauskrecht, Daqing He.

Dissertation Defenses

2016-17

2017-18

At the ISP, PhD degree progress is measured by four milestones— 1) Course requirement completion, 2) PhD preliminary examination, 3) PhD comprehensive examination, and 4) PhD dissertation. Dissertation defense is the final milestone.

In the academic year 2016-17, two ISP students successfully defended their thesis— Mahdi Pakdaman, and Phillip Walker.

Dissertation Defenses

Obtaining Accurate Probabilities using Classifier Calibration

Defense Date: August 5, 2016



Mahdi Pakdaman
Postdoctoral Researcher,
Harvard University,
Boston, MA.

Learning probabilistic classification and prediction models that generate accurate probabilities is essential in many prediction and decision-making tasks in machine learning and data mining. One way to achieve this goal is to post-process the output of classification models to obtain more accurate probabilities. These post-processing methods are often referred to as calibration methods in the machine learning literature.

This thesis describes a suite of parametric and non-parametric methods for calibrating the output of classification and prediction models. In order to evaluate the calibration performance of a classifier, we introduce two new calibration measures that are intuitive statistics of the calibration curves. We present extensive experimental results on both simulated and real datasets to evaluate the performance of the proposed methods compared with commonly used calibration methods in the literature. In particular, in terms of binary classifier calibration, our experimental results show that the proposed methods are able to improve the calibration power of classifiers while retaining their discrimination performance. Our theoretical findings show that by using a simple non-parametric calibration method, it is possible to improve the calibration performance of a classifier without sacrificing discrimination capability. The methods are also computationally tractable for large-scale datasets as they run in $O(N \log N)$ time, where N is the number of samples.

In this thesis we also introduce a novel framework to derive calibrated probabilities of causal relationships from observational data. The framework consists of three main components: (1) an approximate method for generating initial probability estimates of the edge types for each pair of variables, (2) the availability of a relatively small number of the causal relationships in the network for which the truth status is known, which we call a `\textit{calibration training set}`, and (3) a calibration method for using the approximate probability estimates and the calibration training set to generate calibrated probabilities for the many remaining pairs of variables. Our experiments on a range of simulated data support that the proposed approach improves the calibration of edge predictions. The results also support that the approach often improves the precision and recall of those predictions.

Committee: Gregory F. Cooper (Advisor), Milos Hauskrecht, Shyam Visweswaran, Jeff Schneider.

Dissertation Defenses

Improving Operator Recognition and Prediction of Emergent Swarm Behaviors

Defense Date: March 2, 2017



Phillip Walker
Researcher,
Smart Information Flow
Technologies (SIFT) LLC,
Minneapolis, MN.

Robot swarms are typically defined as large teams of coordinating robots that interact with each other on a local scale. The control laws that dictate these interactions are often designed to produce emergent global behaviors useful for robot teams, such as aggregating at a single location or moving between locations as a group. These behaviors are called emergent because they arise from the local rules governing each robot as they interact with neighbors and the environment. No single robot is aware of the global behavior yet they all take part in it, which allows for a robustness that is difficult to achieve with explicitly-defined global plans. Now that hardware and algorithms for swarms have progressed enough to allow for their use outside the laboratory, new research is focused on how operators can control them. Recent work has introduced new paradigms for imparting an operator's intent on the swarm, yet little work has focused on how to better visualize the swarm to improve operator prediction and control of swarm states. The goal of this dissertation is to investigate how to present the limited data from a swarm to an operator so as to maximize their understanding of the current behavior and swarm state in general. This dissertation develops—through user studies—new methods of displaying the state of a swarm that improve a user's ability to recognize, predict, and control emergent behaviors. The general conclusion is that how summary information about the swarm is displayed has a significant impact on the ability of users to interact with the swarm, and that future work should focus on the properties unique to swarms when developing visualizations for human-swarm interaction tasks.

Committee: Michael Lewis (Advisor), Stephen Hirtle, Christian Schunn, and Katia Sycara.

New Graduates

An Interview with Dr. Mahdi Pakdaman

Mahdi Pakdaman Naeini joined ISP in 2011 and graduated in 2016. His advisor during his PhD was Dr. Gregory Cooper from the Department of Biomedical Informatics.



Mahdi Pakdaman
Postdoctoral Researcher,
Harvard University,
Boston, MA.

Jeya: *How was your experience at the ISP?*

Mahdi: I had a unique and exciting experience at ISP. Homa, my wife, and I were both luckily to be graduate students at ISP at the same time. We used to spend more time in ISP doing research and hanging out with our colleagues rather than being home!

ISP is such an extraordinary program with many knowledgeable, kind, and collaborative faculties focused on variety of research related to AI. This gave us as students a great opportunity to get familiar with a wide spectrum of AI research from theory focused up to more like application focused research. One of the cool features of ISP is its bi-weekly seminars which enable us to hear from all of these variety of AI applications including natural language processing, machine learning, biomedical informatics, human computer interactions, educational data-mining, and even AI-applications in law. It is really a pretty multi-disciplinary program.

Jeya: *Do you have any suggestions to improve the program?*

Mahdi: I really admire the interdisciplinary spirit of ISP, and also appreciate its collaborative culture. The curriculum and the milestones perfectly designed for a successful multi-disciplinary research program. I would like to thank all ISP faculties, specially Prof. Jan Wiebe, for their dedication and hard efforts in shaping ISP in its current extraordinary form.

In terms of having a suggestion, considering the fact that many of the alumnus of ISP are currently faculty members at other universities, I think it would be still beneficial for the student if they could have an opportunity of either TA-ing or teaching courses in the program. Considering the fact that the ISP program is a research oriented program it is even possible to make TAing as an optional requirement for the students.

New Graduates

Jeya: *What have you been doing since graduation?*

Mahdi: Currently, I am a postdoctoral fellow at Harvard University with a joint position in Computer Science department and Harvard Medical school. My main research is focused on biomedical informatics. In particular, I am building large scale inference models to analyze the data of patients with autism spectrum disorder. The goal is to use machine learning technique to build scalable ASD progression models.

Jeya: *Do you have any word of advice for the new students at the ISP?*

Mahdi: I do not have any particular advice. By the way, I believe the students should get the best advantage of the flexible, interdisciplinary and collaborative culture of the program which has made it a unique AI focused program.

New Graduates

An Interview with Dr. Lingjia Deng

Lingjia Deng joined the ISP in 2011 and graduated in 2016. Her advisor during her PhD was Dr. Janyce Wiebe from the Department of Computer Science.



Lingjia Deng
Research Scientist,
Bloomberg LP,
New York City, NY.

Jeya: *Can you briefly describe your dissertation work and your experience with your thesis defense?*

Lingjia: My dissertation focuses on recognizing sentiments from news and political editorials. Built upon the state-of-the-art work in recognizing opinions, my dissertation further infers the opinions that are indicated in the text. We manually develop several inference rules and then use these rules as constraints in a Markov Logic Network. The input into the MLN are the opinions extracted by the state-of-the-art and the output are the inferred opinions.

In terms of thesis defense, I spend a lot of time getting familiar with the details of my thesis as well as high level of the whole thesis work. The committee may ask about either the implementation details and why this piece of work is important. Don't get panic if the committee points out the limitation of the thesis. No single work can solve all the questions. The limitations are the directions of further research work.

Jeya: *How was your experience at the ISP?*

Lingjia: I really like ISP a lot. It focuses much on Artificial Intelligence and we can know people from different background. For example, some of my friends at ISP are doing robotic research, applying natural language processing techniques to law filings or applying machine learning to the medical area. This interdisciplinary study broadens our views during the PhD study. I also like the curriculum of ISP. In the first year we are required to take two statistical courses which are super useful for students in the field of AI.

New Graduates

Jeya: *What have you been doing since graduation?*

Lingjia: I'm now a Natural Language Processing researcher at Bloomberg. Currently I work on extracting financial information from the financial news and filings. For example, we want to automatically determine whether there is revenue reported in this news and if so we we want to automatically extract the revenue number, the time of that revenue (which year and which quarter), the multiplier of that revenue (e.g., million, billion), etc. We use the models in the paper or develop our own models which are more suited for our tasks. It usually begins with prototyping the model and then deploys the model into production if the performance is good. People in our team are encouraged to publish and can attend academic conferences twice a year.

Jeya: *Do you have any word of advice for the new students at the ISP?*

Lingjia: I have a suggestion for senior students at ISP who are preparing for job talks in the interview. It is not necessary and it is not recommended to put all your publications in a single job talk. There have been good candidates with strong background who put too much content in the talk, which does not give a good impression.

New Graduates

An Interview with Dr. Phillip Walker

Phillip Walker joined the ISP in 2010 and graduated in 2017. His advisor during his PhD was Dr. Michael Lewis from the School of Computing and Information.



Phillip Walker
Researcher,
Smart Information Flow
Technologies (SIFT) LLC,
Minneapolis, MN.

Jeya: *How was your experience at the ISP?*

Phillip: My experience was wonderful! I was really excited when I began because I loved the idea of a completely interdisciplinary program with students and professors working in a wide variety of areas and I was not disappointed. I met many people of different academic and cultural backgrounds and learned even more than I had expected. I think the program does a great job of encouraging students to pursue their interests and preparing them to take significant strides in their careers. I managed to get an excellent job after graduating through my advisor using the skills I'd learned through ISP.

Jeya: *Do you have any suggestions to improve the program?*

Phillip: There's nothing major that I can think of. I think trying to bring in professors to the program for even more areas would make the program even stronger. Much of the program is focused on NLP and machine learning, which are exciting and fast-growing areas, but there are other areas of AI research that I think could be better represented.

Jeya: *What have you been doing since graduation?*

Phillip: I have since moved to Minneapolis, MN and am working for SIFT, LLC, a small business and government contractor that works primarily in AI, human-computer interfaces, and cybersecurity. I hope to come back and visit soon!

Jeya: *Do you have any word of advice for the new students at the ISP?*

Phillip: If you don't understand what someone is talking about, ask questions! I think many at ISP are already quite good at this, but people love talking about their work, and asking them to explain it further makes them happy, helps you learn, and forms a connection that could be mutually beneficial down the road. Also, make sure you get out of your comfort zone and take some classes outside of ISP. I took a few robotics courses at CMU, and another in cryptography at the iSchool, and learned a ton. They were also influential in the way I thought about AI problems (and helped me get my current job!)

ISP Events

ISP Welcome Picnic

ISP is hosting the annual picnic to welcome new students, and faculties. Here they meet and greet the current faculties, alumni, and students. The picnic is going to be held on Friday, September 15th at Bartlett Shelter in Schenley Park. We would like to invite all the local ISP alumni and we hope to see all of you and your families there. We'll have lots of food and beverages — you bring the Frisbees!

Here are the details of this event—

Where: Bartlett Street Shelter @ Schenley Park,
Overlook Drive,
Pittsburgh, PA 15207

When: Friday, September 15th
3:30pm – 6:30pm (or later)

Please let us know if you will be able to join us by emailing Michele: paum4b@pitt.edu

ISP 30th anniversary celebrations



The proposal to form the Intelligent Systems Program was approved in 1986 and the program started in 1987. So, this year marks the 30th year anniversary of ISP. We will be hosting an all-day seminar on **March 16th 2018**, capped by a banquet, and a keynote featuring **Dr. Martha Pollack** (currently the 14th President of Cornell University; former ISP director, and former president of AAAI).

We invite all the faculties, students, and alumni of ISP. Please follow the link below, and our social media accounts (*see next page*) to get timely updates on the event.

<http://www.isp.pitt.edu/isp30>

Contact Us

ISP on Social Media

ISP has presence in the social media via Facebook, Twitter, and GMail. We encourage everyone to follow our ISP accounts to get the latest news from our department faculties, students, and alumni. Please share your own stories and updates with us through these pages. You can access ISP on—

 http://bit.ly/isp_pitt_facebook
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 isp.pitt@gmail.com



This was the third edition of the Intelligent Systems Program newsletter. If you have any news or updates to share with us or want us to send you a copy of our newsletter, please send an email to Michele Thomas (paum4b@pitt.edu).

The digital copy of the newsletter is available at:
<http://www.isp.pitt.edu/newsletter>

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