mediaX 2021 Conference, Building Reciprocity: Curiosity and Learning in Humans and Machines

July 13,14 and 15, 2021

Virtual Conference (Zoom)

JULY 13: Welcome

Elizabeth Wilsey, mediaX at Stanford University

The Influence of Culture, Community and Context on Learning

Martha Russell, Executive Director of mediaX at Stanford University

Human and machine learning are resource and context dependent, structured, and scaffolded; they are both influenced by multi-level and longitudinal factors, as well as new technological frontiers.

1. Both human and machine learning are resource and context dependent, structured and scaffolded; they are both influenced by multi-level and longitudinal factors, as well as new technological frontiers.
2. The mutual benefit of reciprocity between human and machine learning is a dynamic and complex ecosystem and evolves more like a spiral than a loop.
3. Empowering the human experience through advances in machine learning requires transformation of the human talent pipeline.

Designing Systems for Digital Instruction, Session 1

Tomás Nascimento, Senior Technician, SEST SENAT

New insights emerge as the National Transportation Industry of Brazil initiates a transition from in-person classes to simulated driving experiences, with an emphasis on the human learning model.

1. Despite applying machine learning and artificial intelligence actions are a reality, it is very important to keep the continuous improvement by the "human learning" model, learning from bad design, bad results and revisiting the human values applied on each solution created.
2. There is still a big struggle, when it comes to reciprocal outcomes for human and machine learning, between projects funding and political and market demands.
3. Automated systems will be more or less used according to rational and subjective factors. Ultimately, it will depend on our human subjectivity and will (or not) to use them.

Designing Systems for Digital Instruction, Session 2

Rebecca Bettencourt, Senior Workforce Development Manager, E.&J. Gallo Winery

When engaging with learners, instructional designers must focus on the real-world skills needed by future workers, and strive to spark curiosity and entrepreneurial spirit in their students.

1. At E.J. Gallo, workplace learning is driven by the needs of the workers, as well as the greater community around the company. This includes close collaboration with local schools and youth programs. (you could provide some examples).
2. As we transition to a post-pandemic learning environment, Learning and Instructional Design are at a critical junction. It is imperative to be strategic in the use of technology for learning.
3. For many workers, most effective learning occurs when instruction occurs in the physical workplace, particularly when it involves interactive learning with machinery.

Designing Systems for Digital Instruction, Session 3

Derek Li, Founder & Chief Education Technology Scientist, Squirrel Ai Learning

With the use of an AI teaching platform, Squirrel.AI shifts from traditional teaching to personalized education, with human teachers functioning as coaches for the students.

1. Contextual and Intelligent Educational Experience as seen on

Squirrel Ai's Adaptive Platform is a paradigm shift from the traditional, rigid and inefficient factory model of education. It provides the most practical and economical solution to overcome the equity and access obstacles for disadvantaged learners. This takes a community effort to achieve.
2. The Reciprocity between Ai and humans can be achieved through the co-teach and co-learn models, where AI, human learner, and human teacher/coach form the dynamic, meaningful, and productive triangle.
3. Ai combined with multimodal perception/interaction, along with the learning science and pedagogical innovation such as Squirrel Ai's MCM® framework can go beyond traditional teaching/learning of textbook knowledge to empower the life-long learning of competencies required for future careers.

Inclusive Innovation for Developing Relevant Learning Assessments
Jean-Claude Brizard, President and CEO, Digital Promise

We must develop ecosystemic changes in education, particularly with an integrated approach that also centers underserved learners through co-creation and collaboration.
1. Context and Connections matter, not just in curriculum and pedagogical practice, but in assessment as well.
2. If we want to change paradigm and improve outcomes for our most marginalized students, we cannot work in silos. We need to include the perspectives of people who are most the vulnerable.
3. Digital Promise's Inclusive Innovation construct is a great and viable path to making innovations in the entire teaching and learning cycle durable.

JULY 14: Welcome
Elizabeth Wilsey, mediaX at Stanford University

A Taxonomy for Curiosity in Humans and AI
Nick Haber, Assistant Professor, Stanford Graduate School of Education

Current research is developing a taxonomy for human curiosity; mimicking these actions with computational systems can create a learning loop between human learning and artificial intelligence.
1. Human learning is interactive learning. We learn by interacting with our environments and the people within them, and we have evolved to be very good at interacting in order to learn. By embracing how humans learn through interaction, and in particular how they learn through social interaction, we can design AI that learns with and from us — and teaches us — more naturally.
2. In engineering AI that learns through interaction, one important component to design is curiosity, or intrinsic motivation: how we decide what to attend to and interact with in order to learn. We might be motivated by novelty, or difficulty, or some measure of expected increase in understanding, or something else entirely.
3. Here we present a taxonomy for curiosity as well as a study that compares human behavior to AI implemented with various types of curiosity. Through work like this, AI can help us better understand how we learn as well as how different people learn differently.

Limitations for Curiosity and Discovery in Open AI – GPT-3
David Evans, Stanford Distinguished Visiting Scholar, President of David A. Evans LLC
Peter Norvig, Stanford Distinguished Visiting Scholar, Director of Research at Google Inc
Ed Hovy, Research Professor, Language Technologies Institute, School of Computer Science, Carnegie Mellon University

GPT-3, a foundational model of natural language processing, with both strengths and weaknesses, projects significant possibilities for the power and future of language generation by machines.
1. GPT-3 is a remarkable and powerful system, capable of human-like performance in some areas of natural-language processing (NLP). But we should beware of the "ELIZA

Effect" and resist reading more intelligence into its behavior than actually exists. GPT-3 is still a black box – It's not possible to comprehend the architecture and data structures or to draw analogies from them to anything in nature; it's not possible to "explain" behavior.
2. GPT-3's strengths reflect (especially) its rich lexical-semantic abstractions. This makes local text cohesion possible and even supports some extended text production. High-dimensional lexical-semantic relations provide a basis for many NLP tasks, especially at the level of sentences and paragraphs.
3. GPT-3's weaknesses result from the inability to engage in planning and user modeling, in addition to the paucity of conversational pragmatic and para-linguistic information in its training corpus. This leads to a failure in coherence in extended text production. Language-mediated human interaction requires functionality that goes beyond rich language understanding – including practical world knowledge (e.g., naïve physics; causation), non-verbal components of communication, planning, intentionality, and modeling the interlocutor.
4. Evaluations are important – it's important to understand what they say about system performance – but they are incomplete and do not measure the range of behavior required for human discourse.

JULY 15: Welcome
Elizabeth Wilsey, mediaX at Stanford University

Leaky Abstractions for Designing AI Experiences
Hari Subramonyam, Assistant Professor, Stanford Graduate School of Education

Collaboration between engineers and user experience designers can be enhanced by systematically exchanging information at appropriate levels of detail and can enable iterative prototyping throughout the AI design process.
1. Design-engineering boundaries lead to knowledge blindness and premature specifications.
2. Leaky Abstractions are necessary for collaboration.
3. Deferred specifications through vertical prototyping and constant evaluation reduces friction in AIX design process.

Teaching AIs to Provide Feedback to Humans, Session 1
Hirotsugu Kashimura, President, Amada AI Innovation Laboratory Inc
1. How do skilled and unskilled operators act in the fab. Process?
2. Why do they act like this?
3. What can AI do to help this relationship?

Teaching AIs to Provide Feedback to Humans, Session 2
Ramya Malur Srinivasan, AI Researcher, Fujitsu Research of America
1. In recent years, there has been an increased emphasis on AI ethics—to understand and mitigate adverse impacts of artificial intelligence (AI) technologies on society.
2. In this regard, reflexive design can serve as a useful feedback mechanism to help educate AI scientists and developers about different ethical perspectives, potential adverse outcomes, and gaps in the AI pipeline.
3. Generative artworks have the potential to play this role by serving as accessible and powerful educational tools for surfacing different perspectives.

Teaching AIs to Provide Feedback to Humans, Session 3
Stephanie Guamàn, Lead User Researcher, Facebook AI Team
1. Experiencing some AI-powered products can feel unpredictable, and mysterious. While much of the experiences may be "relevant", it may not meet people in their mood or context needs in the moment. This can leave people feeling dissatisfied with the experience

2. People often turn to folk theories to explain the way AI works. Folk theories are "Intuitive, informal theories that individuals develop to explain the outcomes, effects or consequences of technological systems" (Devito, Gergel, Birnholtz "Algorithms Ruin Everything"). Folk theories can

influence people's behaviors and sense of trust and agency with technology.

3. Even with a host of ways to signal people's preferences to the algorithm, people crave a more natural interaction with machines (e.g. social and emotional etiquette, mood/context fit). At the same time, we must also be mindful of the challenges inherent to this domain (e.g. balancing the need for personalization with agency).

4. There are huge opportunities for us to consider as we reimagine the future of the human-machine relationship:
   **How might machines learn the way people learn across cultures, senses, and feelings?*
   **How might we lean on diverse ways people experience and tell stories?*
   **How might we enable people to feel empowered by the possibilities while also protecting people's sense of safety and autonomy?*

mediaX at Stanford University is a forum, an incubator of ideas, and a programmatic framework to encourage and support multi-disciplinary research initiatives. Our initiatives explore how understanding people can improve the design of technologies – in the areas of learning, mobility, collaboration, entertainment and commerce.

As the affiliate program to Stanford's H-STAR Institute (Human Science and Technology Advanced Research) in the Graduate School of Education at Stanford University, mediaX programs are grounded on respect for different approaches to discovery and centered on our belief in the power of collaboration – between business and academic researchers, on campus and around the world.

In trusted relationships, aligned on questions that are important for the future, mediaX collaborations seed campus-wide research and coordinate industry interest. Through dialogue and collaboration, university and industry researchers challenge what we know now and stretch intellectual resources to gain new insights relevant to academic and business collaborators.

Together, we pursue new insights on how information technology affects people's lives, how to better design products and services to make them more usable, and the innovative use of communication technologies to improve the human experience.

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