What theories and design methodologies should be used for creating AI systems that best empower people?

More Design Thinking

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AI Systems based on Machine Learning (ML) are a new powerful tool that allows us to address problems and questions that were not possible to face with traditional programming. ML is deeply impacting Design Thinking and the related Human - Centered Design process, its practice and perhaps its same principles. Figure 1 presents the crucial paradigm change in designing, at least some, of the solutions based on digital technologies.
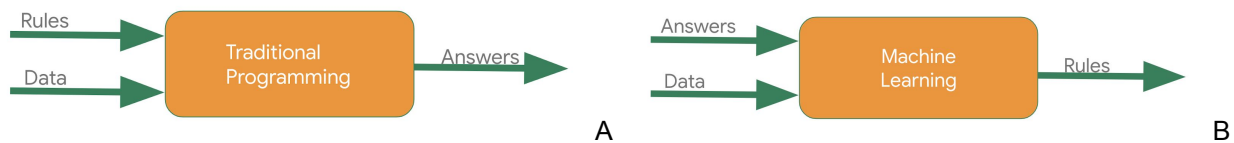
Figure 1 The shift in coding

In traditional programming we are used to creating applications by breaking down requirements into composable problems that can then be coded against. We can represent that with diagram A. Rules and data go in answers come out. Rules are expressed in a programming language and data may come from a variety of sources from local variables all the way up to databases. Machine learning rearranges this diagram where we put answers and data in and then we get rules out.

The identification / production of data and their relationships with answers become fundamental for successful projects. In ML the rules that will govern the systems are out of our direct control and are inferred by the machine learning process. This simple fact has a big impact for the whole human-centered design process.

Machine learning changes the way we think about a design issue. In current design practice, the design team involves interaction designer, software engineers, graphic designer, etc. and is trained to logically define user and system requirements, trying to solve the related problems. With Machine Learning the focus shifts toward natural science: we're making observations about an uncertain world, running experiments, and using statistics, we don't use directly logic to analyze the results of the experiment. The identification of what type of data to use, what type of features to select or create, what kind of answer to produce define a playground that can change the nature of the problem itself.

The ability to think like a scientist expands our horizons and opens up new areas that we couldn't explore without such an approach.

Recently, we designed interactive systems based on Machine Learning solutions where the design processes were conducted under the umbrella of the Human-Centered Design methods and the mindsets

of Design Thinking. However, methods and mindsets were elaborated and partially transformed to face the new challenges posed by the use of the Machine Learning tools. In one case, related to a system for early detection of attacks to Bank ATMs (Rossi et al, 2019), the key factor for producing an effective solution was the identification of a special kind of data source (and the related feature extraction process). The developed methodology allowed us to receive the authorization by the Italian Data Protection Authority to run field experiments with real transactions on ATMs located in city-centers. In another case the winning factor was the live construction of the dataset with the same operators that use the system for the detection of excessive metal material (burrs) in the forms produced by the Iron and Steel Industry (Burresi et al, 2020). In this case the construction of the dataset by the collaborative effort of all the personnel of the company led to the opportunity to identify not only the burrs but also problems in the management of pouring. These two case studies presented similarities as well peculiarities regarding the methodologies employed but both needed a revision of the way to approach the design challenges.

Resting both on our experience and on well established Machine Learning solutions, we would like to pose the two following statements concerning the issue of "What theories and design methodologies should be used for creating AI systems that best empower people?"

STATEMENTS:

1) Machine Learning does not question the core pillars of Design Thinking and Human-Centered Design. Which are: A) People Centered Design - *Empathize*. B) Creative approach to design challenges - *Define and Ideate*. C) Experimentation and iteration - *Prototyping*.

Well Known examples in this direction are products like Netflix, AirB&B, Spotify. Infact, the opposite is true, ML pushes for more intensive practice of the pillars of Design Thinking and Human-Centered Design.

2) Machine Learning has a big impact on most of the Mindsets of Design Thinking, two in particular: Embracing Ambiguity and Radical Collaboration.

Embracing Ambiguity: Successful application of ML is mainly related to problem setting and not simply to problem solving. ML makes clear that Problem Framing and Problem Solving cannot be separated without deep consequences for the type of results we could get. ML is a powerful tool to help us define what questions are worth giving an answer.

Radical Collaboration: ML can empower people and, at the same time, have a higher degree of success, by the close collaboration of all the stakeholders involved in a design process. This should happen from the construction of the design brief down to the validation on the field. It is by working side by side of data scientists, users, customers and designers that the winning patterns of data and responses can emerge.

Reference
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