What users understand about algorithms

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A PATH TO UNDERSTANDING THE EFFECTS OF ALGORITHMS AWARENESS

- Facebook's News Feed algorithm
  - lack of awareness -> successful design, potentially controversial
- < 25% regular FB users are aware their feeds are curated or filtrated and even less know how to affect that process
- Blackboxing - feels "effortless" when based on the right model of human behaviour
- "Seams" around an interface's construction should remain visible -> facilitate experimentation and innovative use
- Opacity in computational processes
  - Protect intellectual property
  - Removes a state process from public view in the interests of guarding authority
  - Or simply a function of complexity and difficult to avoid

Algorithm security

- SNSs (Social Network Sites)
  - Adaptability (same interface, different users)
  - Security (user needs to believe the system is designed dependable, with their interest in mind)
- E-voting
  - Need to explain how the processes work in order to create trust

Ethics of algorithms as predictive processes

- Consequential prediction
  - Alg. displays possible outcomes for use in a person's decision-making
- Preferential prediction
  - Process anticipates a user's desires and offers options likely to please
- Preemptive prediction
  - Delimits a person's access without providing a choice and often without the person's knowledge

Reverse engineering

- Might be useful strategy for figuring out how an existing technology works, less useful for how it came to work that way
- Complicated - different outcomes for every user
  - Account settings
  - Composition of social network records of past use

PARTICIPATORY TROUBLE: Towards an understanding of alg. structures on Facebook

- Analysis of 66 self-reflective diaries with 470 entries on Facebook use
- 22- 68 years old, 75% female
- How algorithm structures affect interpersonal relationships
- “Egocentric” networks
- Facebook (> 1 billion users)
    - Dynamically reshapes the conditions for social interaction by means of complex algorithm calculations
    - Personal and interactional data that is generated through FB user activity becomes part of the social graph and is visualizes through the timeline and automatically distributed to other users through News Feed
    - Initially News Feed presented users with such a large amount of information making it hard to react (FB aim is to encourage users to interact = provide useful data about themselves)

2010 EdgeRank

- Calculations on the personal and interactional data
- Items (status updates, pictures, videos) as objects, whenever user interact (by tagging, commenting, liking), an edge is created
- Edges have 3 factors that determine the rank
  - Affinity score - measuring patterns of social interaction between two users (profile view)
  - Each edge is weighted to make a difference between different kinds of interaction (comment > like)
  - Recency of each edge

Findings

- Sharing with unclear others (fragmented audience, updates must be slightly amusing)
- Why am I friends with him/her? (access to personal information)
- Not clear how to act and interact with others
- News Feed too predictable and ordinary - people share and say the same kind of things everyday
- -> Instead of maintaining relationships, we are dealing with social space characterized by underlying doubt

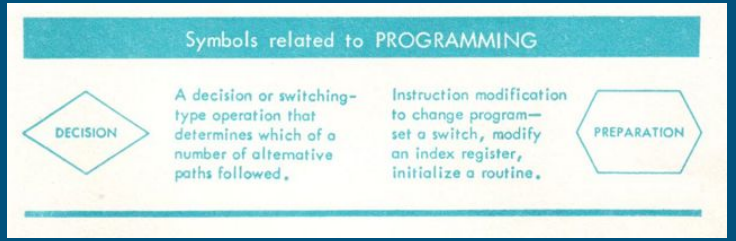
SEEING THE SORT: The aesthetic and industrial defense of “The Algorithm”

- 1960s computer programmer complain about ambiguity of the word “algorithm” and ask if it’s the same as mathematical formula
- Reply: not a formula, rather a word computer science needs to describe a strategy or “an abstract method” for accomplishing a task with a computer
- Formula or computer program
  - Finite set of instruction
- Algorithm
  - Idea “divorced” from a mechanism that implements it

Seeing the sort

- Sorting task is the most common application for algorithm
  - Google (sorts web pages), Facebook News Feed, Netflix recommendation, email (spam, important)
- Nowadays most or even all mediated content is generated by algorithm sort
- Use of search engines is now routine, before the content was mostly “sorted” by date
- Results are ordered in a personalized way based on an algorithm’s judgement about relevance to the user, and bordered by long sidebars of advertisements chosen after an algorithm analyzes users demographics and behaviour

Flowcharting the algorithm



- What is happening inside is a difficult task even for the programmer
- Diagrams and visualizations have been seen as a central to programming
- Remain relevant as a way to “see” the invisible action
- “Cloud” - from network diagram, where a cloud symbol indicates a part of the diagram whose internal details are irrelevant
- Diagram - 1990s Amazon software patent application (instant recommendations)

IBM Flowcharting Template, c. 1980. User:Wtshymanski. Photograph (detail). Wikipedia. Public Domain. http://en.wikipedia.org/wiki/File:Flowchart-template.jpg

The education aesthetic of algorithms vs commercial depiction

- Education
  - Effort to attract the next generation of programmers
  - Visually depicted algorithms
- Commercial depiction
  - Almost entirely absent (commercial motivations typically allow for efficiency comparisons only with competitors)
  - When the algorithms are mentioned, they encourage the notion the algorithm operates without any human intervention, are fair and accurate, free from subjectivity, error, or attempted influence
  - Threat of government regulation (showing how algorithm works)
    - Voluntarily explained in broad terms and depicted as comprehensive
    - http://www.google.com/insidesearch/howsearchworks/thestory/

REASONING ABOUT INVISIBLE ALGORITHMS IN NEWS FEEDS

- Algorithm shapes user's experience and even their perception of the world
- Facebook's News Feed (launched 2006)
  - Not enough feedback mechanism for users to understand the effect of their own actions on the system
- 40 Facebooks daily users
  - 62,5% didn't know about hidden stories in News Feed
- No one outside Facebook knows how the algorithm chooses the best stories

Study

- Phases:
  - 1. Participants visited lab and completed a questionnaire and interview to measure algorithm awareness
  - 2. Participants used an application FeedVis, filled out long open-ended interview
    - Which people/posts would they prefer to see
  - 3. Email to participants after 2-6 months with questions to evaluate the consequences of any inside gained by observing the algorithms outputs

(Un)Aware participants

- Inductively comparing feeds (Some friend's posts appear more oft) or deductively considering network size (there's too much material in general on Facebook)
- Use 20 times per day, light or heavy poster
- Unaware participants made inferences about their personal relationships based on the algorithm output
- Over the course of the study more than half came to appreciate the algorithm (hidden stories are mostly friends interaction with each other)
- Change in use (settings/ changed the interaction with their friends)
- Less dissatisfaction when stories did not receive enough attention from others

ALGORITHM AVERSION: People erroneously avoid algorithms after seeing them err

- Algorithms outperform humans by 10% (136 studies investigating the prediction of human health and behaviour)
- Cause of algorithm aversion:
  - Desire for perfect forecast
  - Inability of algorithms to learn
  - Presumed ability of humans forecasters to improve through experience
  - Algorithms cannot properly consider individual targets
  - Concerns about the ethicality of relying on algorithms to make important decisions
  - Presumed inability of algorithms to incorporate qualitative data

Study

- 5 studies
  - Predict real outcomes from real data
  - participants decide whether to bet on the accuracy of human forecast or statistical model
- Conditions
  - Human
  - Model
  - Model-and-human
  - Control (no experience with model or human forecaster)
- Model outperforms the human, but is not perfect = makes mistakes
- Even when people make larger mistakes than models, participants were more like to choose human

Thank you for your attention