Open Problems in Bridging Systems

Luke Thorburn & Aviv Ovadya

January 2023

bridging An increase in mutual understanding and trust across divides, creating space for productive conflict, deliberation, or cooperation.

bridging is a **property** of **attention allocators**

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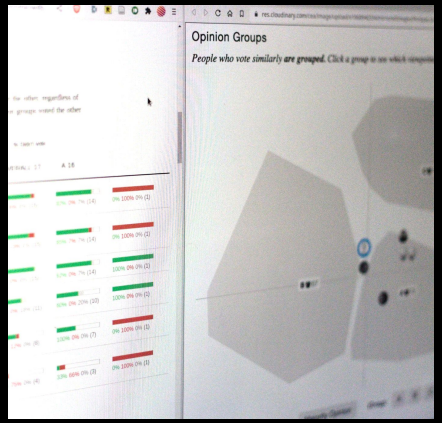
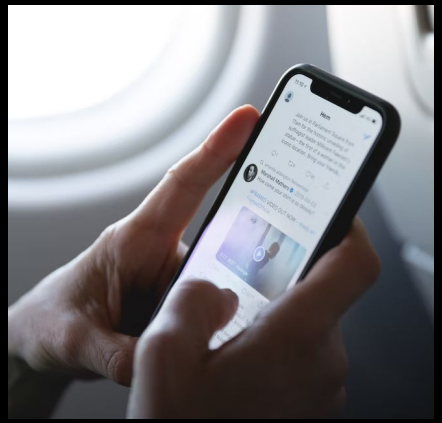
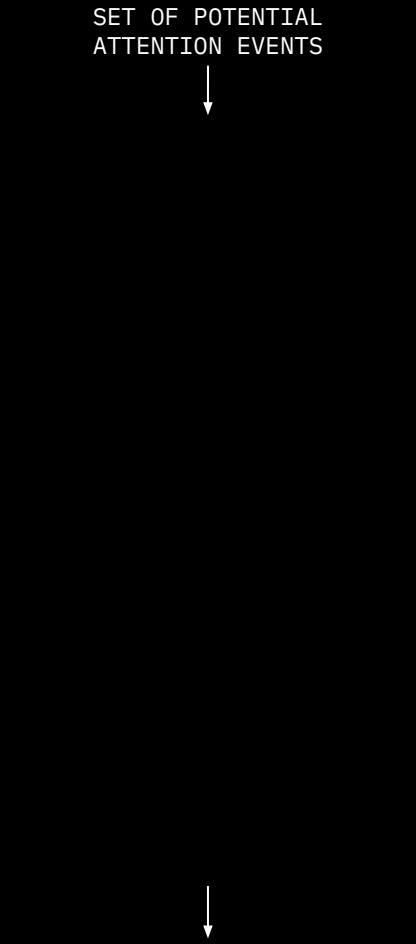
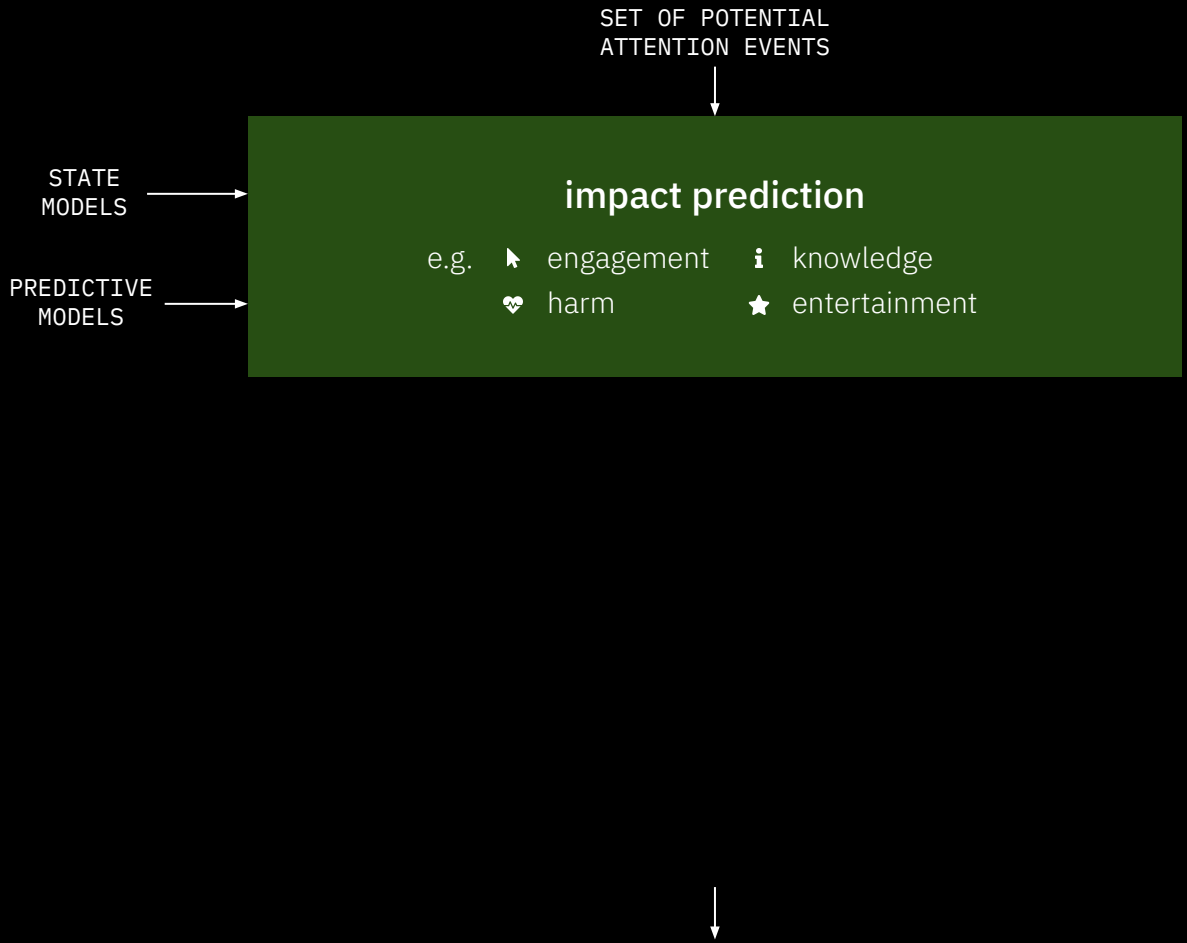





SET OF POTENTIAL
ATTENTION EVENTS
REALIZED ATTENTION EVENT(S)


SET OF POTENTIAL
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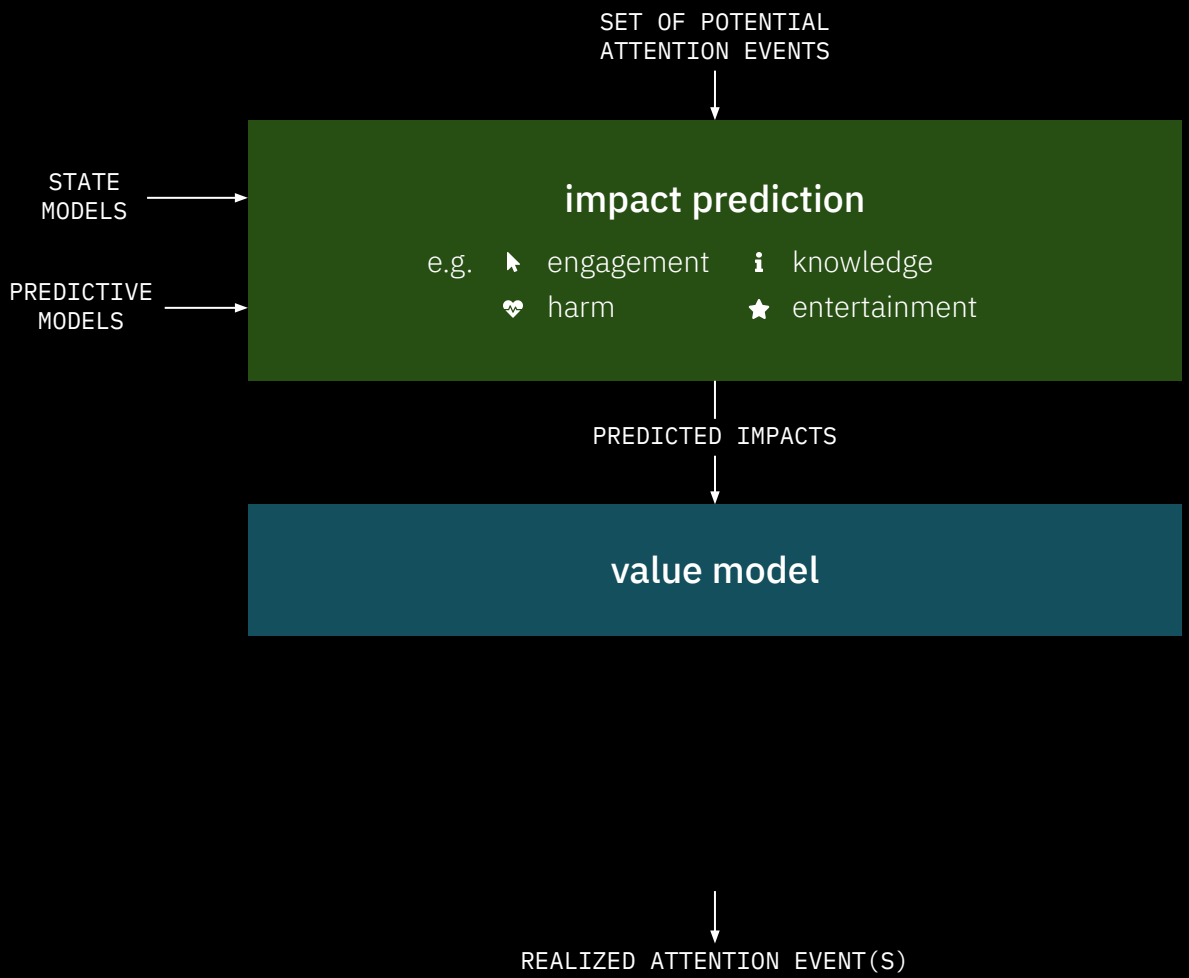
STATE
MODELS
PREDICTIVE
MODELS
impact prediction
e.g.
engagement
knowledge
harm
entertainment
REALIZED ATTENTION EVENT(S)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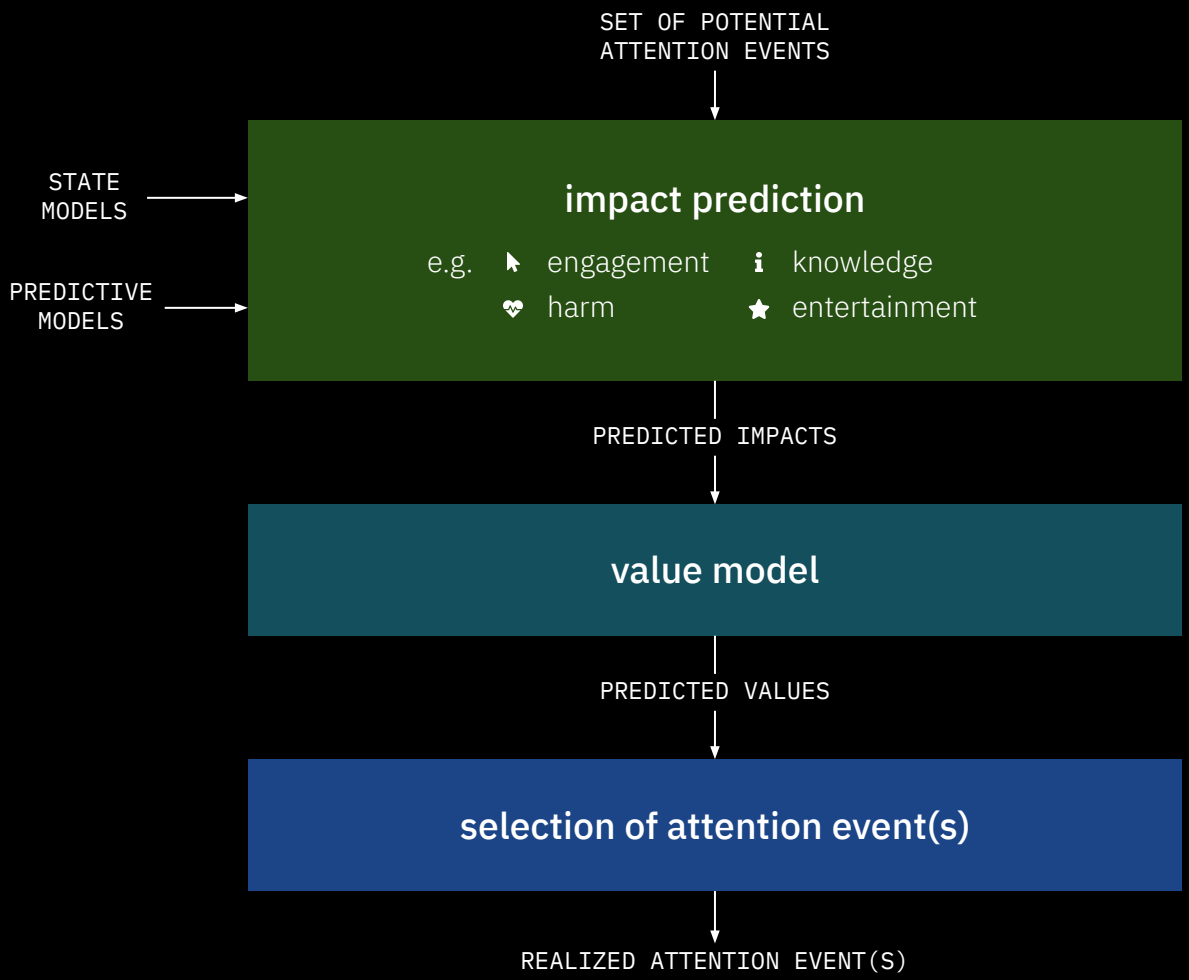
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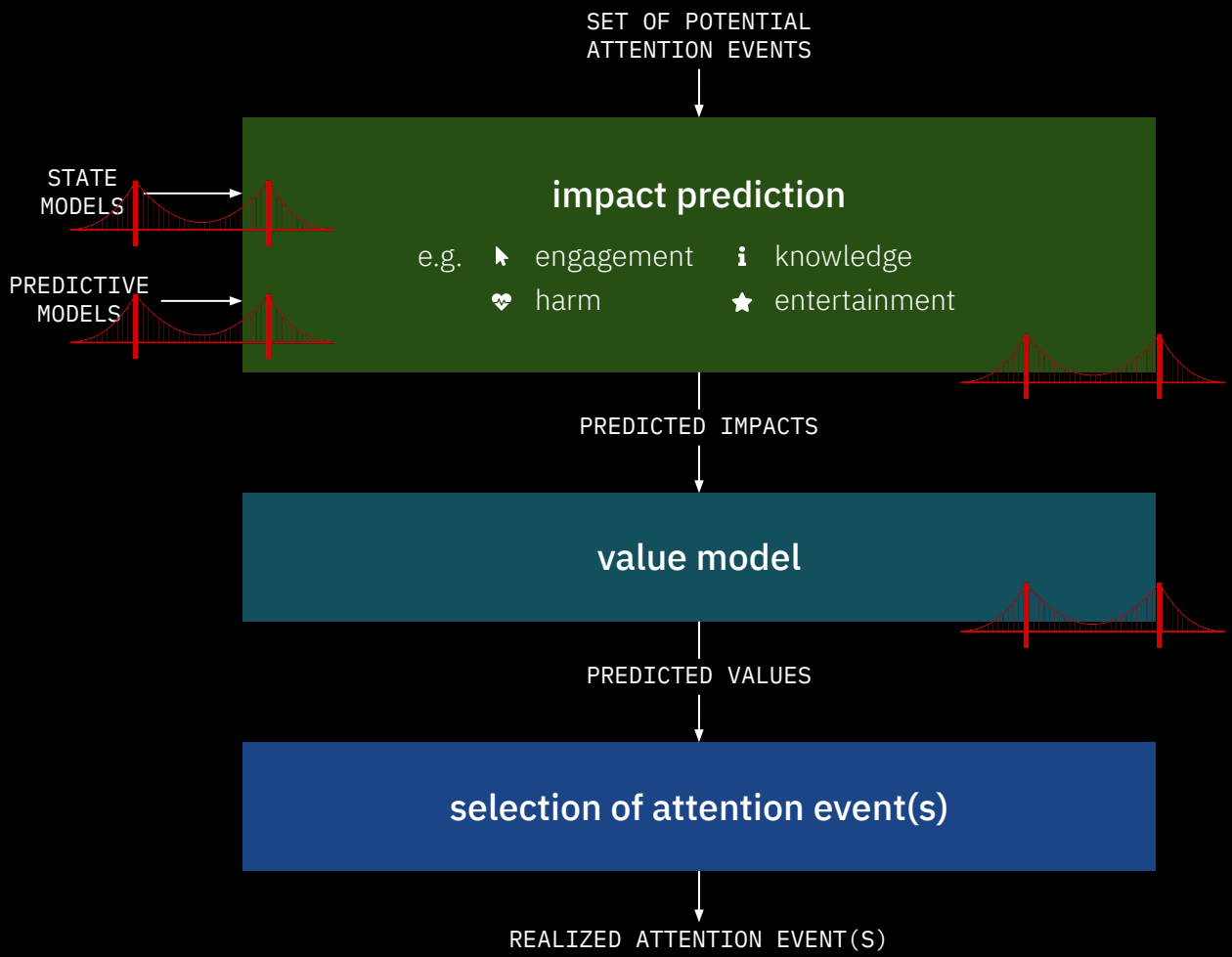
PREDICTED VALUES
selection of attention event(s)
REALIZED ATTENTION EVENT(S)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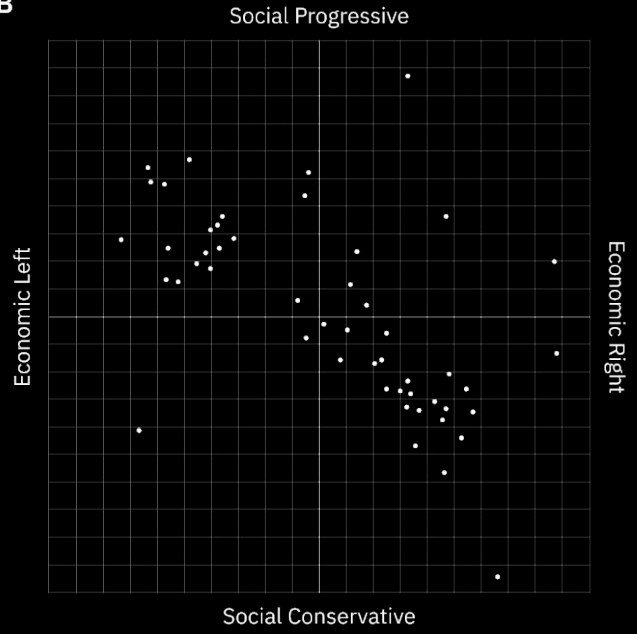
A

B



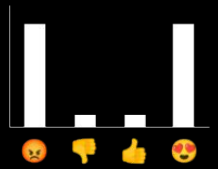
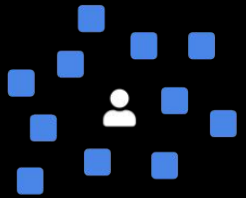
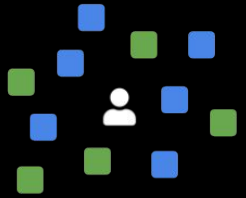
OPEN PROBLEMS

- Elicitation?
- Measurement effects?
- Discrete/continuous? Clustering?
- Limitations?

METRIC	INTUITION	SCOPE	MODEL TYPE	STRUCTURE REQUIRED	SAFE TO OPTIMIZE?	FORMULA
(multi)modality	The extent to which a distribution is bimodal or multimodal.	population	space		NO	There are a number of existing measures—see reference
average absolute deviation	Average distance between each point and the mean.	population	space		NO	$\frac{1}{N}\sum_{x\in\mathcal{X}}\|x-\bar{x}\|$
coefficient of variation	Scalar standard deviation divided by the mean.	population	space		NO	$\frac{1}{\bar{x}}\sqrt{\frac{1}{N}\sum_{x\in\mathcal{X}}\|x-\bar{x}\|^2}$
coverage	The number of distinct attitudes held or the variety of attitudes that at least one person in the population holds.	population	space	bounded space	NO	$\text{Volume}\left(\bigcup_{x\in\mathcal{X}}B_r(x)\right)\ /\ \text{Volume}(\mathcal{X})$
deviation from means	Average distance between an individual and the mean of their group, averaged across groups.	population	space	groups	NO	$\frac{1}{M}\sum_{i=1}^{M}\frac{1}{n_i}\sum_{x\in G_i}\|x-\text{Mean}(G_i)\|$
diameter	The maximum distance between any two points.	population	space		NO	$\max_{x,y\in\mathcal{X}}\|x-y\|$
divergence of means	Average pairwise distance between group means.	population	space	groups	NO	$\frac{1}{\binom{M}{2}}\sum_{i<j}\|\text{Mean}(G_i)-\text{Mean}(G_j)\|$

OPEN PROBLEMS

- Validity / alignment?
- Different contexts?
- Scalability?
- Commensurability?

	diverse approval	feeling thermometer	response bimodality	exposure diversity
“dividing”				
“bridging”				

OPEN PROBLEMS

- Causality?
- Evaluation?
- Prevalence and incentivizability?
- Cross-cultural applicability?

THE OPTIMIZATION STACK

OPEN PROBLEMS

- “bridging bait”?
- Attack resistance?
- Ethics?
- Economic viability?

The Washington Post
Democracy Dies in Darkness

THE TECHNOLOGY 202

Social media can be polarizing. A new type of algorithm aims to change that.

Analysis by Will Oremus
with research by Aaron Schaffer

January 11, 2023 at 9:04 a.m. EST

→ bridging.systems

Bridging Systems

Open Problems for Countering Destructive Divisiveness across Ranking, Recommenders, and Governance

Aviv Ovadya[*]
Harvard University
aviv@aviv.me

Luke Thorburn[†]
King's College London
luke.thorburn@kcl.ac.uk

Divisiveness appears to be increasing in much of the world, leading to concern about political violence and a decreasing capacity to collaboratively address large-scale societal challenges. In this working paper we aim to articulate an interdisciplinary research and practice area fo-