Use of AI for scientific assessments

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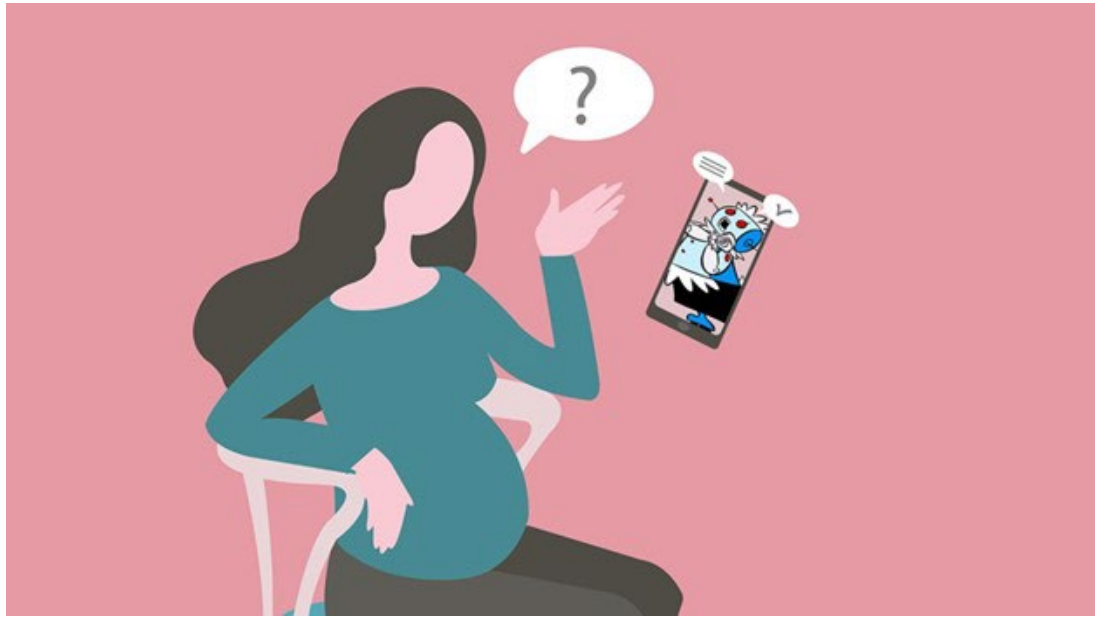
NIH National Institute of Nursing Research

NIH Grant Supports Development of Chatbot to Help New Moms, Babies

Clinical Trial. Our team is now enrolling 400 pregnant and new mothers of color with infants under 6 months of age. Moms will be randomized into two groups: 200 will receive Rosie the Chatbot and 200 will receive monthly baby board books through our Book of the Month Club. Our team will follow moms for a year to track changes in maternal and child health outcomes.

Read the full release

- Rosie the Chatbot is an NIH-funded project led by a research team at the University of Maryland School of Public Health for soon-to-be and new mothers of color 14 years old or older.
- Rosie works as a phone application that supports soon-to-be and new mothers by answering their health questions in an instant with responses being generated from vetted, medically accurate sources.



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Strengths of AI tools for Scientific Assessment

Scalability

AI tools can be used to scale up efforts, thereby increasing coverage of literature analyzed

- Manual reading of relevant literature is increasing difficult as publications increase at an exponential rate
- 130,000 internationally peer-reviewed articles on climate change published between 1990-2021

Performance

If designed correctly, AI tools can provide consistent classification and lower error-rates (compared with manual annotators)

Efficiency and Adaptability

Time saving

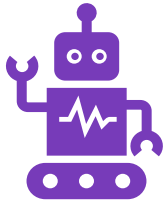
- Ability to do speedy and precise searches based on inclusion/exclusion criteria
- Ability to evaluate trends over time, topics, and across geographies

Limitations of AI for Scientific Assessments

Perpetuate biases in training data or algorithm

-Underrepresentation of certain groups in training data can lead to incorrect predictions for these groups

-Bias outputs can discriminate unfairly against race, gender, social class



Time and resource investment for development

-Need sufficient training data

-Need staff members with expertise in AI and sufficient computation resources

-Need time for developing and/or fine-tuning models, quality checks, and maintenance

Error rate

May be greater than human annotators

- If model was not properly trained and evaluated
- If the task is too complicated for current AI systems

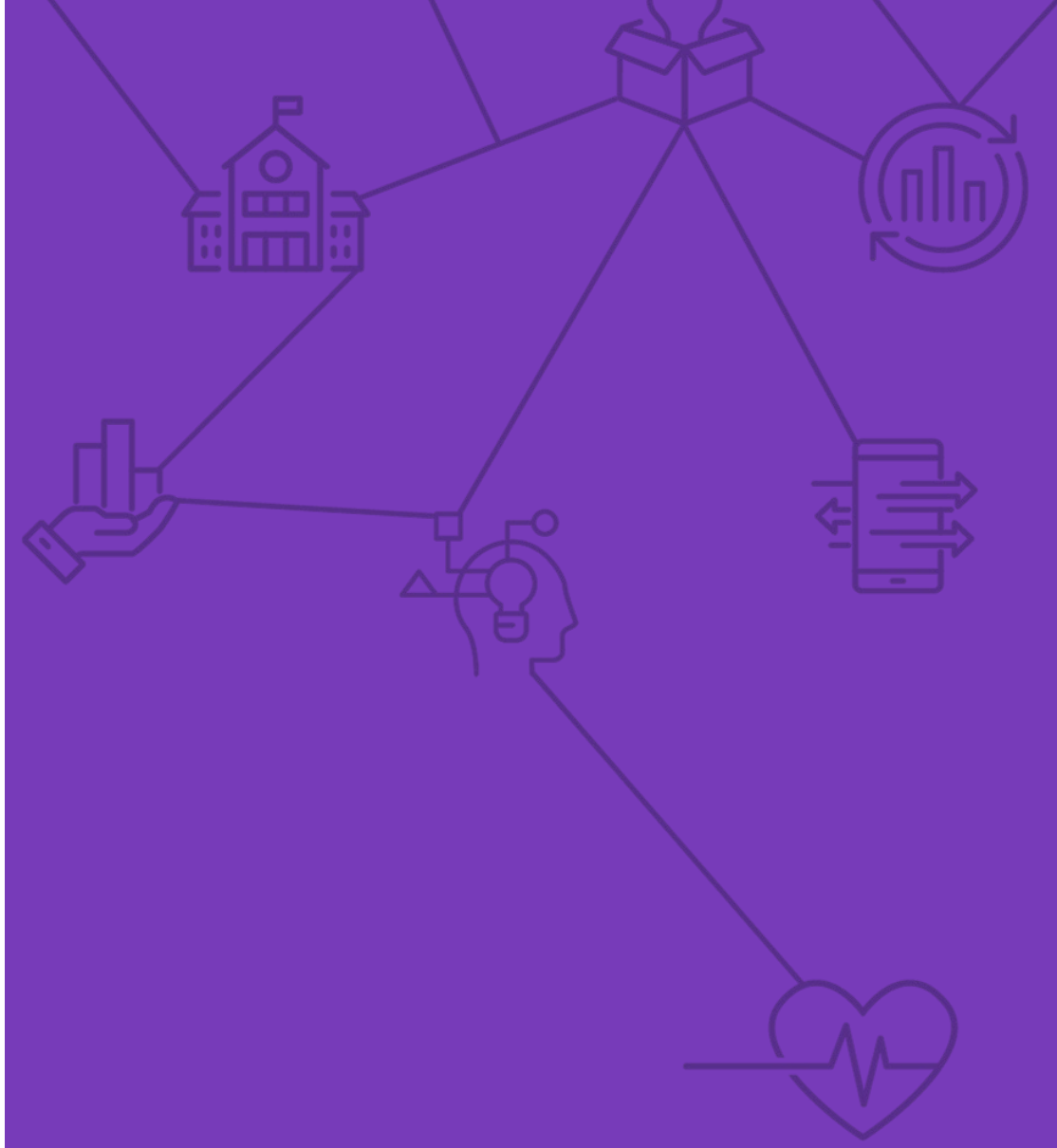
AI products for researchers and research administrators

Literature review tools

- Elicit (developed by Semantic Scholar) - This AI-based search engine uses natural language processing and machine learning to help researchers find relevant academic papers. It can identify key concepts, citations, and connections between papers, and also provides features like topic summaries and literature maps.

- ConnectedPapers - This tool uses machine learning algorithms to analyze the citation network of academic papers and identify relevant literature based on the connections between papers. It can generate visual maps of research topics and highlight influential papers in a field.

- Grammar-Preserving Text Saliency Modulation (GP-TSM)- An AI-Resilient Text Rendering Technique for Reading and Skimming- uses a recursive sentence compression method to identify successive levels of detail beyond the core meaning of a passage, which are de-emphasized by rendering words in successively lighter but still legible gray text.



Data analysis tools

Automated Machine Learning (AutoML) Tools

- Tools like Google Cloud AutoML, Amazon SageMaker Autopilot, and DataRobot offer automated machine learning capabilities, allowing users to build and deploy models with minimal coding or machine learning expertise.
- These tools automate tasks like data preprocessing, feature engineering, model selection, and hyperparameter tuning.

Conversational Analytics and Chatbots

- Tools like ChatGPT, IBM Watson Assistant, Google Dialogflow, and Amazon Lex enable organizations to build and deploy conversational interfaces and chatbots for customer service, data querying, and knowledge management.

Natural Language Processing (NLP) Tools

- Tools like Google Cloud Natural Language, Amazon Comprehend, and SpaCy can analyze and extract insights from text data, such as sentiment analysis, named entity recognition, text classification, and topic modeling.

Components of Expert-guided AI tool

Considerations for training data

High quality

Training data should be high quality (contain gold-standard / ground truth labels)

Breadth of data

Training data contains sufficient breadth to address the range of real-world inputs the AI might encounter

Address data gaps

Identify and address data gaps and shortcomings in the training data that could affect model performance.

- Example: If data covering a subpopulation is missing, finding a solution to obtain that data.

Metrics for evaluating AI-generated text summaries

- Hallucinations
  - When an AI model produces incorrect, misleading, or illogical results
- Factual
  - AI text contains valid and verifiable information
- Coherence
  - Summaries flow logically and are structured in meaningful way
- Vagueness
  - Summaries captures core points and answer specific research questions
- Relevance
  - Summaries are related to the desired topic

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Equity considerations

01

AI tool can be multilingual

- Ingest and summarize literature in multiple languages

02

AI tool can be shared and function offline

- Tool can be dockerized with all relevant components included and shared with relevant collaborators

03

Analyze disparate-impact risks of algorithmic determinations based on:

- Race/ethnicity, color, religion, national origin, sex, gender identity or expression, sexual orientation, familial status, income, or disability

Summary

AI supports the work of the committee rather than replaces it

- While AI is efficient at processing large amounts of data into manageable insights, it may not fully grasp nuances, real-life implications, biases, and unintended consequences in the way humans can.

AI can help relieve bottlenecks in workflow

- Identify the exact task you want done at greater scale, accuracy or consistency with the assistance of AI

Aim for simplicity in system design

- Don't create additional functionality you don't need or want. Restrict to the essential items.
  - Save time and cost. Simple designs also lowers barriers to use.

Acknowledgements

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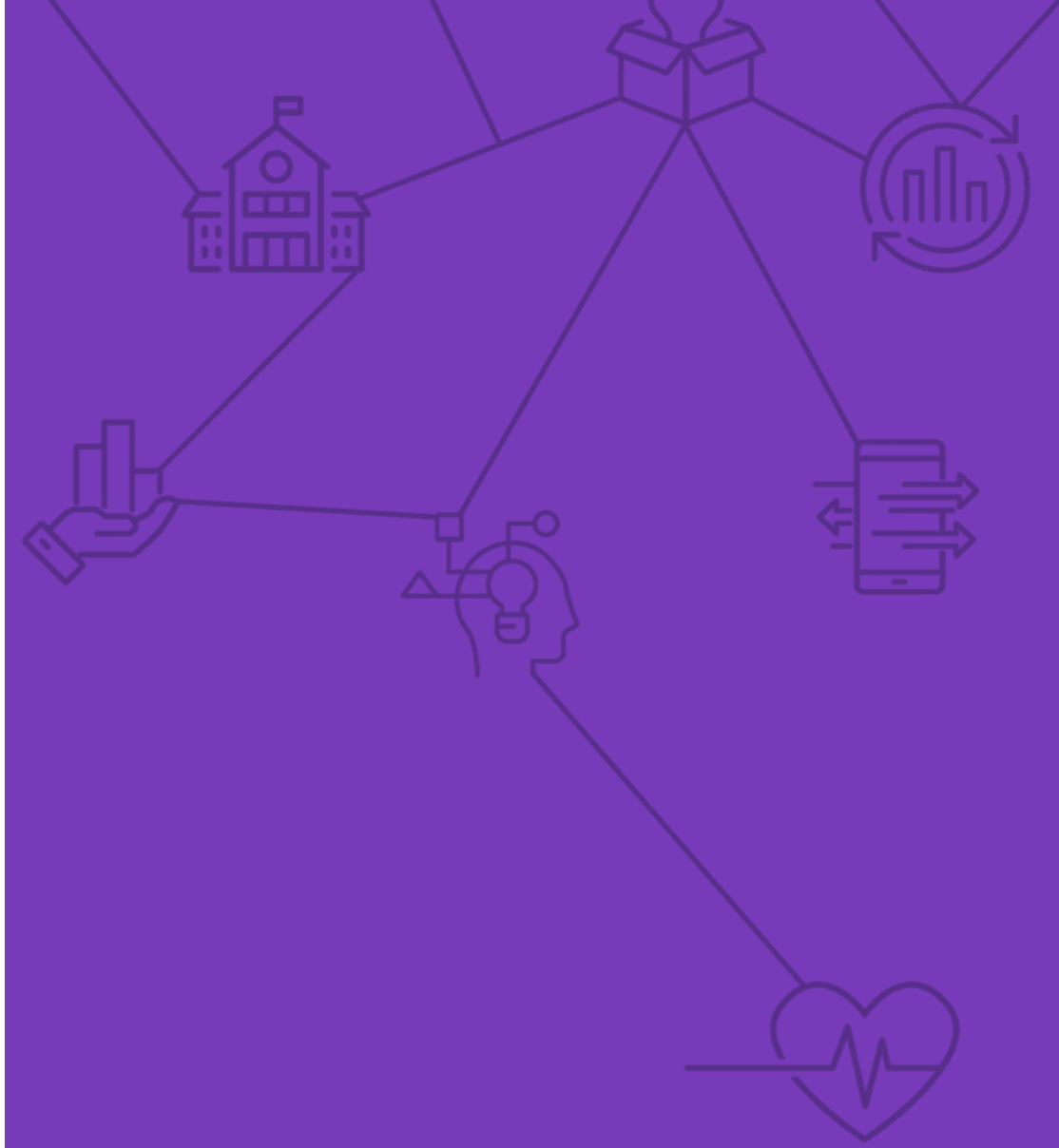

THANK YOU!

Contact Info

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