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EPPS 6323

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EPPS 6323 Project Proposal

Artificial Intelligence (AI) applications have taken on increasingly prominent roles in our everyday lives, finding their application in diverse areas such as translation software, independent driving, and medical procedures and diagnostics. AI applications can significantly improve the effectiveness of everyday tasks and have reached mainstream usage with the introduction of ChatGPT and other similar applications. While AI promises to make our lives easier and more efficient, public perceptions of AI applications' abilities, potential, and dangers are not uniform. Previous research has assessed public perceptions of AI applications in various sectors, including the healthcare and human enhancement sectors. Our project contributes to the dialogue on whether the public is open to AI enhancements of the human body, seeking to understand the public sentiment surrounding this topic and testing whether survey respondents have distinct opinions on specific forms of applications or can be categorized as being primarily supportive or critical of human enhancement through AI. We further test whether survey respondents' perceptions of brain enhancement permit a prediction of their perceptions of embryonic genome editing, testing the underlying assumption that a respondent's perception of one subtopic of AI human enhancement allows predictions of their perceptions of the other.

To test our theory, our group project will investigate society's perspectives on AI and human enhancements, specifically focusing on the utilization of chip implants for cognitive function and embryonic gene editing. Our aim is to identify and explore relationships between respondents' opinions on these subjects and determine if an individual's stance on one topic can predict their attitude towards the other. Utilizing a dataset from the Pew Research Center and opinion articles from a variety of news outlets, our project will comprise of five parts: a literature review of the current state of academic research regarding popular perceptions of AI advances in medicine and the utilization of automated methods in healthcare and disease prevention, a sentiment analysis of opinion articles regarding the increased prevalence of AI in everyday lives, the development of an explanatory model, creation of a predictive model, and a final review of our research findings.

Research Question

Do attitudes towards chip implants impact attitudes towards embryonic gene editing?

Follow Up Questions

- Does ideological affiliation impact the attitudes of individuals toward these topics?
- Do ideological affiliations in our dataset correspond to opinions in aligned news outlets?
- Do we see a change over time in the sentiment of the coverage of these topics?

Metrics

We will utilize the American Trends Panel "AI and Human Enhancement" dataset, published by the Pew Research Center in March 2022. Several questions that we have identified as potential independent (opinions on brain enhancement) and dependent (opinions on genome editing) variables include:

Neural Chip Implants

- BCHIP2 Do you think widespread use of computer chip implants in the brain allowing people to far more quickly and accurately process information would be a…
  - 1 Good idea for society, 2 Bad idea for society, 3 Not sure
- BCHIP14 Computer chip implants in the brain could be used for a number of purposes. Would you favor or oppose the use of computer chips implants in the brain for each of the following purposes?
  a. To treat age-related decline in mental abilities
  b. To allow increased movement for people who are paralyzed
  c. To make it possible for thoughts in the brain to search content on the internet without typing
  d. To translate thoughts in the brain, without speaking, into text on a screen

Embryo Editing

- GENEV4 If the use of gene editing to greatly reduce a baby's risk of developing serious diseases or health conditions over their lifetime becomes widespread, do you think each of the following would happen?
  a. Even if gene editing is used appropriately in some cases, others would use these techniques in ways that are morally unacceptable
  b. These gene editing techniques would help people live longer and better quality lives
  c. Development of these gene editing techniques would pave the way for new medical advances that benefit society as a whole
  d. These gene editing techniques would go too far eliminating natural differences between people in society
- GENEV5 If the use of gene editing to greatly reduce a baby's risk of developing serious diseases or health conditions over their lifetime becomes widespread, which statement better describes how you would feel about this development?

- ○ 1 As humans, we are always trying to better ourselves and this idea is no different
- ○ 2 This idea is meddling with nature and crosses a line we should not cross
- GENEV13 Gene editing could be used for a number of purposes. Would you favor or oppose the use of gene editing for each of the following purposes?
a. To change a baby's physical characteristics to make them more attractive
b. To treat serious diseases or health conditions that a person currently has

This dataset also has different demographic information available, including gender, race/ethnicity, education, and religious affiliation.

For the sentiment analysis section of our project, we plan to acquire opinion articles from a variety of news outlets utilizing Nexis Uni utilizing keywords like AI in healthcare, neural implant, Neuralink, CTRL-Labs, Syncron International AB, CRISPR, gene-editing, and germline editing.

Literature Review

Our literature review will consist of several journal articles on attitudes towards AI and human enhancements. We focus on research assessing public opinions on gene therapy, genome editing, and invasive procedures intended to enhance brain performance in healthy patients to acquire a baseline understanding of previous academic research on public opinion regarding human enhancement through AI.

Delhove, Osenk, Prichard, & Donnelly (2020): Public Acceptability of Gene Therapy and Gene Editing for Human Use: A Systematic Review

De-Lima-Santos, M.-F.; Ceron, W. (2022): Artificial Intelligence in News Media: Current Perceptions and Future Outlook.

Dietram A. Scheufele et al., U.S. attitudes on human genome editing. Science357,553-554(2017).

Lahr, Schwarts, Heimbach, Aertsen, Richart, & Ball (2015): Invasive brain–machine interfaces: a survey of paralyzed patients' attitudes, knowledge and methods of information retrieval

McCaughey, Budden, Sanfillipeno, et.al (2019): A Need for Better Understanding Is the Major Determinant for Public Perceptions of Human Gene Editing

Morrison and de Saille (2019): CRISPR in context: towards a socially responsible debate on embryo editing

Nijboer, Clausen, Allison, & Haselager (2013): The Asilomar Survey: Stakeholders' Opinions on Ethical Issues Related to Brain-Computer Interfacing

Ormond KE, Bombard Y, Bonham VL, Hoffman-Andrews L, Howard H, Isasi R, Musunuru K, Riggan KA, Michie M, Allyse M. (2019): The clinical application of gene editing: ethical and social issues.

Reinares-Lara, Olarte-Pascual, Pelegrin-Borondo (2018): Do you want to be a cyborg? The moderating effect of ethics on neural implant acceptance.

Robillard JM, Roskams-Edris D, Kuzeljevic B, Illes J. Prevailing public perceptions of the ethics of gene therapy.

Methodology

Explanatory Model

Hypothesis (H0 and H1)

H0: Opinion on neural chip implant has no effect on opinion on embryonic gene editing.

H1: Opinion on neural chip implants has an effect on opinion on embryonic gene editing

Descriptive Statistics and Visualization

Regression

Predictive Model

PCA: for Dimensionality Reduction: Implement Principal Component Analysis to enhance K-means clustering effectiveness by minimizing data noise, isolating key features, boosting computational efficiency, and improving result interpretability.

EDA: Descriptive Statistics and Visualization

Data Mining: utilizing an unsupervised process (clustering) to determine variables that we should use in the hypothesis.

Regression utilizing variables identified in the data mining process.

Anticipated Challenges

- While we've identified diverse opinion articles relevant to our research question, extracting data from Nexis Uni for our sentiment analysis corpus may pose challenges.
- Some demographic data in our dataset lacks documentation in the accompanying metadata, necessitating a more in-depth analysis to extract valuable insights from these variables.
- We must engage in a discussion and reach consensus on the optimal statistical learning method for our predictive model, ensuring accuracy in our analysis.