

Welcome to this session:

Data Science for Social Good

The session will start shortly...

Questions? Drop them in the chat. We'll have dedicated moderators answering questions.





What is Safeguarding?

Safeguarding refers to actions and measures aimed at protecting the human rights of adults, particularly vulnerable individuals, from abuse, neglect, and harm.

To report a safeguarding concern reach out to us via email:

safeguarding@hyperiondev.com



Live Lecture Housekeeping:

 The use of disrespectful language is prohibited in the questions, this is a supportive, learning environment for all - please engage accordingly.

- No question is daft or silly ask them!
- For all non-academic questions, please submit a query:

www.hyperiondev.com/support

- To report a safeguarding concern reach out to us via email:
 - safeguarding@hyperiondev.com
- If you are hearing impaired, please kindly use your computer's function through Google chrome to enable captions.

Learning Outcomes

- Define and explain the role of data science in social good initiatives, including areas such as public health, education, poverty reduction, and humanitarian aid.
- **Explain theoretical frameworks** for **designing data-driven solutions** that prioritize equity, sustainability, and ethical responsibility.
- Analyse case studies where data science has driven positive social impact, understanding methodologies, data sources, and ethical considerations.
- ❖ Identify and evaluate ethical concerns in social good applications, including issues of bias, privacy, and unintended consequences.
- * Assess potential challenges and propose solutions to ensure responsible and impactful use of data science for social good.



Lecture Overview

- → Data Science for Social Good
- → Theoretical Frameworks
- → Case Studies and Real World Applications
- → Ethical Concerns & Solutions





- A. Using data to maximize profit in businesses
- B. Applying data science techniques to address societal challenges
- C. Automating social services using Al
- D. Collecting public data without ethical concerns





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- A. Public health
- B. Disaster response
- C. Predicting stock prices
- D. Education accessibility





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What is one major challenge when applying data science to social good projects?

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- B. The difficulty in accessing quality, unbiased data
- C. The need for complex blockchain implementations
- D. The lack of government regulations



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Data Science for Social Good

Data science has transformed industries like finance, healthcare, and technology. But can it also be a force for social good? Governments, NGOs, and research institutions increasingly use data-driven approaches to tackle challenges like poverty, climate change, and public health crises. However, implementing these solutions effectively requires overcoming issues like bias, accessibility, and ethical concerns.





- Have you seen examples where data science has been used to solve social problems?
- What challenges do you think arise when applying data science in real-world social contexts?





Data Science for Social Good





- * The application of data science techniques and methodologies to tackle social issues and improve the well-being of individuals and communities
- It aims to move beyond simply extracting insights from data and focuses on creating solutions that can improve people's lives and address systemic problems.
- Nonprofit organizations, civic agencies, and public sectors recognize data science's immense potential to address social challenges and drive positive societal change.

Have a look at <u>GoogleAl's Social</u>
<u>Impact page</u> to see how they've been using Al for Social Good.





Data Science for Social Good

Key Areas of Impact:

 Healthcare: Predicting disease outbreaks, optimising hospital resources.

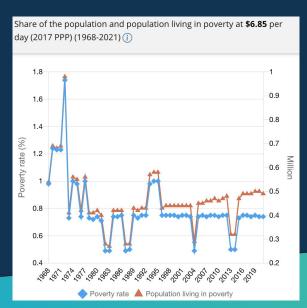


Source: WHO's Al for Health Approach



Data Science for Social Good

- Key Areas of Impact:
 - Poverty & Inequality: Identifying underserved communities, targeting aid effectively.



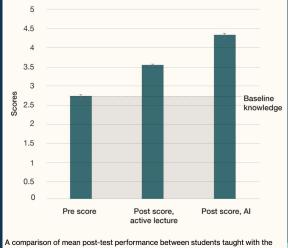
The World Bank has been using various tools to collect and share useful data with the aim to help track and understand poverty, its causes and its impacts.





Key Areas of Impact:

 Education: Improving learning outcomes through personalised Al tutors.



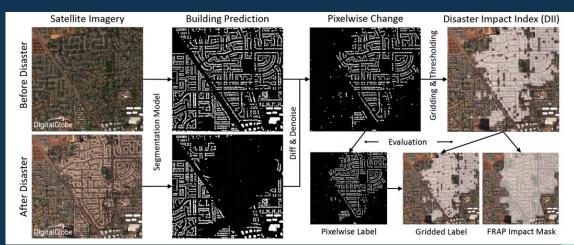
A comparison of mean post-test performance between students taught with the active lecture and students taught with the AI tutor. Dotted line represents students' mean baseline knowledge before the lesson (i.e. the pre-test scores of both groups). Source: "AI Tutoring Outperforms Active Learning," Gregory Kestin, Kelly Miller, Anna Klales, Timothy Milbourne, Gregorio Ponti

A <u>Harvard study</u> found that engagement doubled with students who were assisted by an AI tutor.



Data Science for Social Good

- Key Areas of Impact:
 - Disaster Response: Using satellite imagery & Al to detect and mitigate natural disasters.



Source: Detecting Disaster Damage with Al



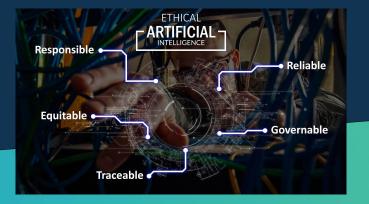


Theoretical Frameworks





- How to Design Data Solutions for Social Good:
 - Fairness & Bias: Avoiding bias in algorithms to ensure equitable outcomes.
 - Transparency & Interpretability: Making Al-driven decisions understandable.
 - o Sustainability: Long-term benefits rather than short-term fixes.





Theoretical

- We can aim to ensure that our tools and methodologies are aligned with the overarching goals of Data Science for Social Good using these frameworks as guidelines:
 - <u>Data4Good Framework</u> balancing impact with ethics by laying out a roadmap for responsible data sharing in the UAE.
 - Al Ethics Guidelines proposed by organizations like the EU, UNESCO to provide a global resource for policymakers, regulators, academics, the private sector and civil society to find solutions to the most pressing challenges posed by Artificial Intelligence.





BREAK





Case Studies





Case Studies

Predicting Crime in Chicago Using Al

Researchers at the **University of Chicago** developed an algorithm to **predict crime** by analysing the time and spatial coordinates of discrete events. The model **successfully predicted crimes** across various U.S. cities, including Chicago, Atlanta, and Los Angeles. However, it also **revealed biases in police responses**, indicating increased attention in wealthier neighborhoods at the expense of less advantaged areas.





NASA's AI for Disaster Response

NASA, in collaboration with IBM Research, developed an **open-source artificial intelligence model** to support a variety of weather and climate applications. This AI model leverages NASA's extensive satellite data to improve the resolution of regional and local weather and climate models. It supports applications such as **tracking changes in land use**, **monitoring disasters**, and **predicting crop yields** worldwide.

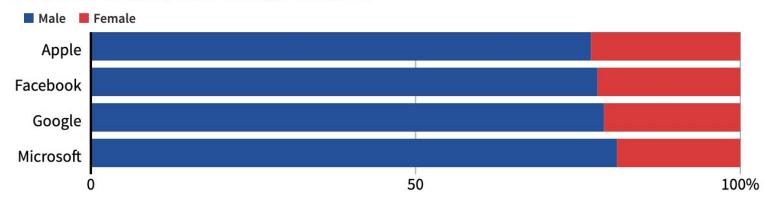






❖ Bias in Al Models: How biased datasets can reinforce discrimination.

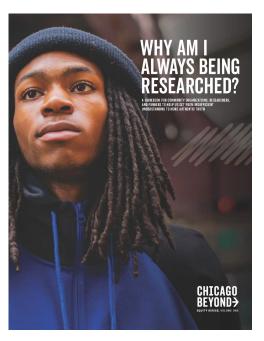
EMPLOYEES IN TECHNICAL ROLES



Amazon had to scrap it's recruiting tool after observing that the model was biased against women since it had been trained on biased hiring data.



Privacy & Consent: Handling personal data responsibly.



Governments, corporations, universities and other researchers frequently rely on data collected from marginalized populations, yet these communities rarely benefit equitably from the insights or policies derived from their information. This imbalance raises significant ethical concerns about privacy, exploitation, and agency. This guideline was released to aid in responsible and equitable data sharing.



Transparency & Accountability: Ensuring AI decisions can be explained.

Requirements of AI transparency







Interpretability



Accountability

Whenever AI is being used, it's important that decisions made by the system are explainable (we know **why** the decision was made), interpretable (we know understand **how** the system works) and accountable (we can **correct mistakes** and the system **learns from mistakes**). If not, systems could be biased, unreliable or untrustworthy.





Future Trends



Future of Data Science for Social Good

Emerging Technologies in AI & Data Science:

- Federated Learning for privacy-preserving AI.
- Explainable AI (XAI) for better transparency.
- Al-driven climate solutions (carbon footprint tracking).

How Students Can Get Involved

- Open-source projects for social good (DataKind, UNICEF's Alinitiatives).
- Collaborate with NGOs, research groups working on AI for Good.



Which of the following is a key challenge when applying machine learning to social good?

- A. The presence of bias in datasets
- B. The high cost of implementing AI solutions
- C. The lack of advanced AI models
- D. The difficulty in hiring data scientists



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- A. Collecting more unverified data
- B. Prioritizing speed over accuracy
- C. Using explainable AI models to detect bias
- D. Removing ethics considerations from models



Which technique is commonly used to ensure fairness in social good applications?

- A. Collecting more unverified data
- B. Prioritizing speed over accuracy
- C. Using explainable AI models to detect bias
- D. Removing ethics considerations from models





- A. Creating better insurance policies for affected individuals
- B. Reducing government involvement in emergency situations
- C. Ensuring all countries receive the same level of aid
- D. Predicting disaster impact using satellite and weather data



What is one way data science has improved disaster response?

- A. Creating better insurance policies for affected individuals
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- D. Predicting disaster impact using satellite and weather data



Summary

- ★ Data science has the power to **drive social change** when used **responsibly**.
- ★ Case studies show its impact on health, disaster response, education, and poverty reduction.
- ★ Challenges like bias, privacy, and scalability must be carefully managed.
- ★ Ethical considerations should always be at the core of social good applications.



CoGrammar

Q & A SECTION

Please use this time to ask any questions relating to the topic, should you have any.

Thank you for attending







