

Algorithmic foundations and ethics in AI: from theory to practice course

Toolkit for synchronous sessions

CU1 | AI ethics - a practical approach
Case study

Case study



Case study

Description for trainers

	Description
Task description	We'll consider a case where AI was used in agriculture and see how the five ethical principles of Beneficence, Non-maleficence, Autonomy, Justice and Explicability were fulfilled with this solution.
Description of how to do the task	Group work (3-4 persons per group). See information on the following pages.
Estimated time to do the task	20-30 minutes.
Suggestion of sources for doing the task	In the booklet students you can find more thorough explanations on the different principles.
Detailed description of how to deliver the task	See information on the following pages.
Information on the deadline for the task delivery	During the synchronous session/ teacher led session.
Contact information or how to clarify doubts	The teacher must provide a form of contact. (It could be an email address, a telephone number...)

Case study

Fictional case for students

Case Study: AI in agriculture - overuse of pesticides

Background: a startup developed an AI-driven agricultural solution aimed at increasing crop yields. The AI system uses data from drones, soil sensors, and weather forecasts to provide farmers with precise recommendations on when and where to apply pesticides. The goal is to optimize pesticide use, reduce crop loss, and improve productivity.

Problem: while the AI solution initially seemed successful, over time it became clear that the **algorithm heavily prioritized maximizing crop yields without adequately considering the long-term environmental impact. The AI recommended frequent pesticide applications, leading to several adverse effects:**

Environmental impact:

- **Soil degradation:** the excessive use of pesticides led to soil contamination, reducing soil fertility and harming beneficial microorganisms.
- **Water pollution:** Runoff from the fields carried pesticides into nearby water bodies, contaminating local water sources and harming aquatic life.
- **Biodiversity loss:** the increased use of pesticides caused a decline in pollinator populations, such as bees, and other beneficial insects, disrupting local ecosystems.

Human health risks:

- **Residue on produce:** High levels of pesticide residues were found on crops, posing health risks to consumers.
- **Farmer exposure:** Farmers and agricultural workers faced increased health risks due to prolonged exposure to high levels of pesticides.



IMAGE SOURCE | Freepik



IMAGE SOURCE | Vecteezy

Case study Question

In the CU 1, we handled the ethical principles of Beneficence, Non-maleficence, Autonomy, Justice and explicability.

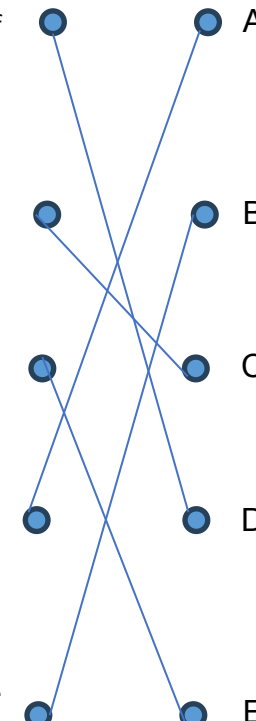
Link the statements around the case with correct ethical principle from A to E:

- | | | |
|---|----------------------------------|---|
| 1. The AI system focused solely on maximizing crop yields without considering the negative environmental impact or the health risks posed to humans. This lack of consideration for the broader consequences led to significant harm. | ☒ | ☒ A) Justice |
| 2. The AI's recommendation of frequent pesticide use caused environmental degradation and health risks to farmers and consumers, thereby causing harm rather than preventing it. | ☒ | ☒ B) Explicability |
| 3. The AI system did not provide farmers with options or inform them of the potential long-term impacts of the recommended pesticide use, undermining their ability to make informed decisions. | ☒ | ☒ C) Non-maleficence |
| 4. The AI-driven solution disproportionately affected local communities, particularly those dependent on local water sources and ecosystems for their livelihood, failing to ensure fair and equal consideration of all stakeholders. | ☒ | ☒ D) Beneficence |
| 5. The AI system lacked transparency in its decision-making process. Farmers were not given clear explanations for the recommendations, nor were they made aware of the potential negative impacts, preventing them from challenging or understanding the AI's decisions. | ☒ | ☒ E) Autonomy |

Case study Solution

In the CU 1, we handled the ethical principles of Beneficence, Non-maleficence, Autonomy, Justice and explicability.

Link the statements around the case with correct ethical principle from A to E:

- 
- A diagram consisting of five blue dots arranged in two vertical columns. The left column has five dots, each connected by a blue line to a dot in the right column. The connections are: Statement 1 to A, Statement 2 to C, Statement 3 to E, Statement 4 to D, and Statement 5 to B.
- 1. The AI system focused solely on maximizing crop yields without considering the negative environmental impact or the health risks posed to humans. This lack of consideration for the broader consequences led to significant harm.
 - 2. The AI's recommendation of frequent pesticide use caused environmental degradation and health risks to farmers and consumers, thereby causing harm rather than preventing it.
 - 3. The AI system did not provide farmers with options or inform them of the potential long-term impacts of the recommended pesticide use, undermining their ability to make informed decisions.
 - 4. The AI-driven solution disproportionately affected local communities, particularly those dependent on local water sources and ecosystems for their livelihood, failing to ensure fair and equal consideration of all stakeholders.
 - 5. The AI system lacked transparency in its decision-making process. Farmers were not given clear explanations for the recommendations, nor were they made aware of the potential negative impacts, preventing them from challenging or understanding the AI's decisions.
- A) Justice
- B) Explicability
- C) Non-maleficence
- D) Beneficence
- E) Autonomy

Case study

Tips & hints

Tips for teacher

- You can either make this question eg. in Kahoot, Mentimeter, Google forms or similar or keep it as a group discussion.
- For more insights and considerations, you can also ask the students to read this article and discuss around the environmental impacts of the AI solutions during the session: [The Real Environmental Impact of AI | Earth.Org](#)

Hints for students

1. Justice is about fairness and equality.
2. Explicability involves transparency and the ability to understand and challenge AI decisions
3. Non-maleficence is about avoiding harm
4. Beneficence involves acting in the best interest of society and the environment.
5. Autonomy involves respecting the decision-making capabilities of individuals.

THANK YOU

Project number: 2022-1-ES01-KA220-HED-000085257



The European Commission's support for the production of this publication does not constitute of the contents, which reflect the views only of the authors , and the Commission cannot be held responsible for any use which may be made of the information contained therein.

