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

Toolkit for synchronous sessions

## CU1 | AI ethics - a practical approach

Case study

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

# 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).<br>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.<br>(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.
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
## Solution

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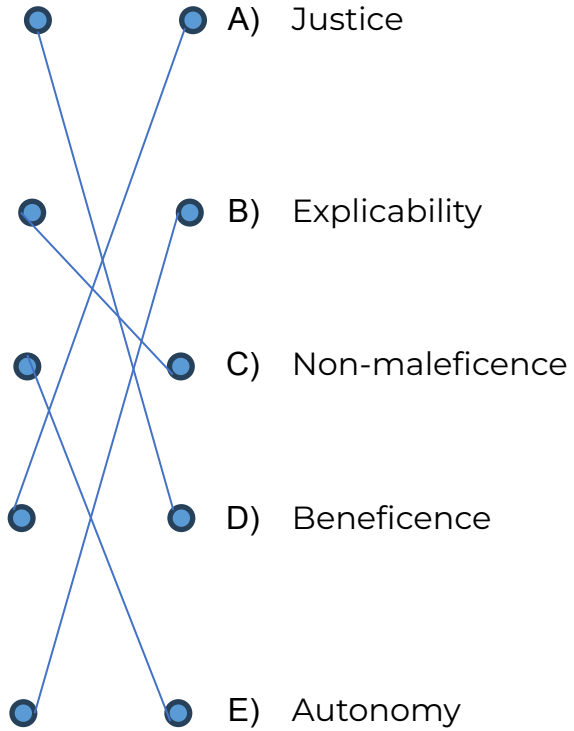

# Case study
## Tips & hints

**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

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