

Unit 1 -- Revisiting AI Project Cycle

Class 10

The overview of the six stages of the AI Project Cycle

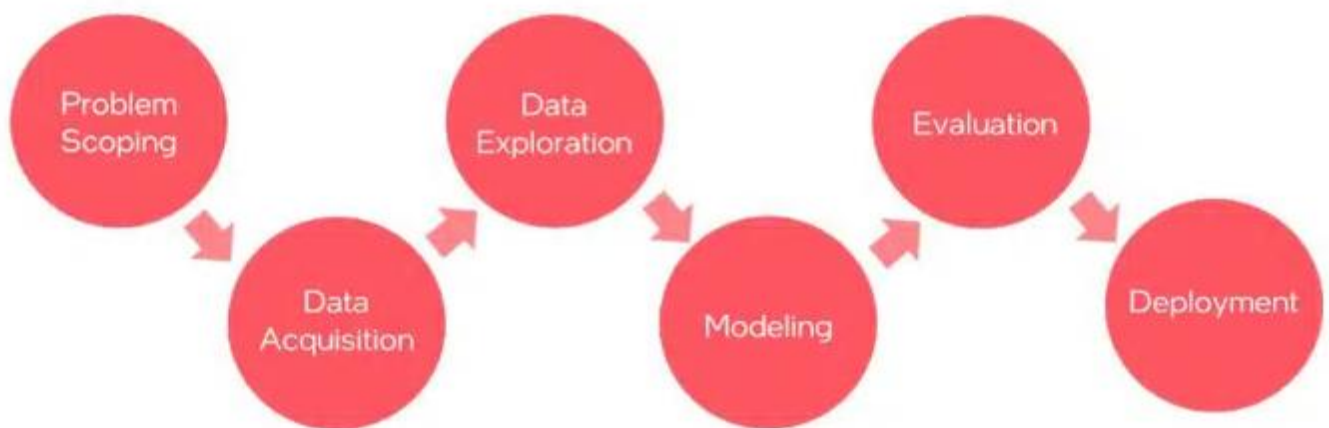
If we have to develop an AI project, the AI Project Cycle provides us with an appropriate framework which can lead us towards the goal. The AI project cycle is the cyclical process followed to complete an AI project.

Definition: The AI Project Cycle is a step-by-step process that a company must follow in order to derive value from an AI project and to solve the problem.

The AI Project Cycle mainly has 6 stages:

Definition: The AI Project Cycle is a step-by-step process that a company must follow in order to derive value from an AI project and to solve the problem.

The AI Project Cycle mainly has 6 stages:



Steps to develop an AI project

- **Step 1: Problem Scoping:** In Problem Scoping we try to find the problem; we look at various parameters which affect the problem we wish to solve so that the picture becomes clearer.
- **Step 2: Data Acquisition:** You need to acquire data which will become the base of your project, data can be collected from various reliable and authentic sources.
- **Step 3: Data Exploration:** The data you collect would be in large quantities, you can try to give it a visual image of different types of representations like graphs,

databases, flow charts, maps, etc. This makes it easier for you to interpret the patterns which your acquired data follows.

- **Step 4: Modeling:** After Exploration you have to decide which type of model you would build to achieve the goal. For this, you can research online and select various models which give a suitable output.
- **Step 5: Evaluation:** Once the modelling is complete, you now need to test your model on some newly fetched data. The results will help you in evaluating your model and improving it.
- **Step 6: Deployment:** Finally, after evaluation, the deployment stage is crucial for ensuring the successful integration and operation of AI solutions in real-world environments, enabling them to deliver value and impact to users and stakeholders.

Introduction to AI Domains

Depending on the type of data, we can divide AI into different domains:

1. Statistical Data
2. Computer Vision
3. Natural Language Processing

1. Statistical Data

Statistical Data is a domain of AI related to data systems and processes, in which the system collects numerous data, maintains data sets and derives meaning/sense out of them. The information extracted through statistical data can be used to make a decision about it.

Example of Statistical Data

Price Comparison Websites – Price comparison websites comparing the price of a product from multiple vendors in one place. for example, PriceGrabber, Racerunner, Jungle, Shopzilla, DealTime. Nowadays, price comparison websites can be found in almost every domain such as technology, hospitality, automobiles, durables, apparel, etc.

2. Computer Vision

Computer Vision is an AI domain works with videos and images enabling machines to interpret and understand visual information and afterwards predict some decisions about it. The entire process involves image acquiring, screening, analyzing, identifying and extracting information.

Examples of Computer Vision

Agricultural Monitoring – Computer vision is employed in agriculture for crop monitoring, pest detection, and yield estimation. Drones with cameras capture aerial images of farmland, which are then analysed to assess crop health and optimize farming practices.

Surveillance Systems – Computer vision is used in surveillance systems to monitor public spaces, buildings, and borders. It can detect suspicious activities, track individuals or vehicles, and provide real-time alerts to security personnel.

3. Natural Language Processing

Natural Language Processing is a branch of artificial intelligence that deals with the interaction between computers and humans using the natural language. The objective of NLP is to read, decipher, understand, and make sense of human languages in a valuable manner.

Examples of Natural Language Processing

Email filters – Email filters are one of the most basic and initial applications of NLP online. It started with spam filters, uncovering certain words or phrases that signal a spam message.

Machine Translation – NLP is used in machine translation systems like Google Translate and Microsoft Translator to automatically translate text from one language to another.

Ethical Frameworks for AI

What do you mean by Frameworks in AI?

Frameworks are a set of steps that help us in solving problems. It provides a step-by-step guide for solving problems in an organized manner. Moreover, frameworks offer a structured approach to problem-solving, ensuring that all relevant factors and considerations are taken into account.

What do you mean by ethical frameworks in AI?

The ethical framework of artificial intelligence helps to guide the development and design of AI systems to ensure that they are following ethical principles and values.

Definition: Ethical frameworks provide a systematic approach to navigating complex moral dilemmas by considering various ethical principles and perspectives.

To design an ethical AI system, the following things are to be followed:

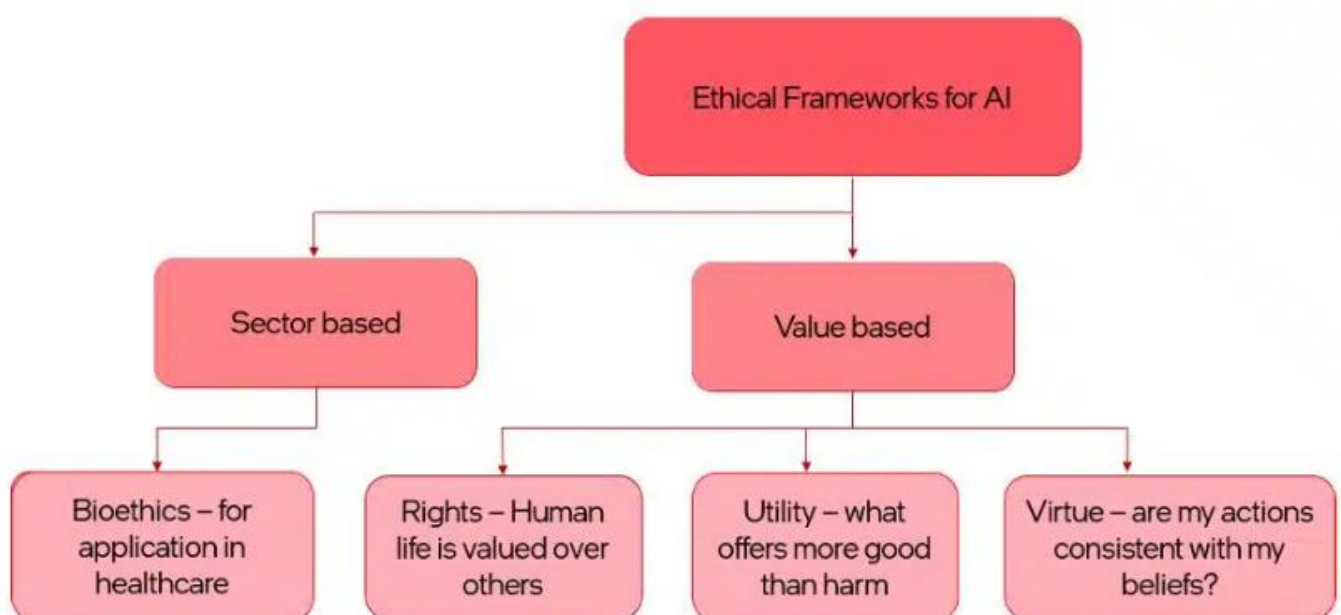
- AI systems should respect user rights.
- AI systems should be safe and fair.
- AI system should protect user privacy.
- AI systems should be transparent.

Why do we need Ethical Frameworks for AI?

Ethical frameworks ensure that AI makes morally acceptable choices. If we use ethical frameworks while building our AI solutions, we can avoid unintended outcomes, even before they take place!

Types of Ethical Frameworks

The various types of ethical frameworks are classified as follows:



Ethical frameworks for AI can be categorized into two main types: sector-based and value-based frameworks.

1. Sector-based Frameworks:

one common sector-based framework is Bioethics, which focuses on ethical considerations in healthcare. It addresses issues such as patient privacy, data security, and the ethical use of AI in medical decision-making. Sector-based ethical frameworks may also apply to domains such as finance, education, transportation, agriculture, governance, and law enforcement.

2. Value-based Frameworks:

Value-based frameworks focus on fundamental ethical principles and values guiding decision-making. Value-based frameworks are concerned with assessing the moral worth of actions and guiding ethical behaviour. They can be further classified into three categories:

- **Rights-based:** In the context of AI, this could involve ensuring that AI systems do not violate human rights or discriminate against certain groups.
- **Utility-based:** Evaluates actions based on the principle of maximizing utility or overall good, aiming to achieve outcomes that offer the greatest benefit and minimize harm. For example, job displacement or privacy concerns.
- **Virtue-based:** This framework focuses on the character and intentions of the individuals involved in decision-making. In the context of AI, virtue ethics could involve considering whether developers, users, and regulators uphold ethical values throughout the AI lifecycle.

What do you mean by bioethics framework in healthcare industry?

The bioethics framework is used in medicine, health, and science. A bioethics framework is a set of principles and rules that help machine to make ethical decisions in healthcare. It helps to address complex issues in healthcare and in the health-related research.

Principles of bioethics:

- Respect for Autonomy.
- Do not harm.

- Ensure maximum benefit for all.
- Give justice.

What are the main principles of AI ethical should be consider for making AI application?

There are three main principles that should be followed whenever developing an AI application:

- **Non-maleficence** – non-maleficence refers to the ethical principle of avoiding causing harm or negative consequences.
- **Maleficence** – Maleficence refers to the concept of intentionally causing harm or wrongdoing.
- **Beneficence** – Beneficence refers to the ethical principle of promoting and maximizing the well-being and welfare of individuals and society.

Case Study

Let's see one case study. Suppose a company wants to design an AI algorithm for optimizing patient care. The objective of the development of the AI algorithm is to help doctors to make better decisions and identify high-risk patients, but due to unintended biases and due to inaccurate data, the AI algorithm makes mistakes due to unfair patterns in the data, which increases the patient risk levels and can compromise patient health. This issue has to be fixed; otherwise, it can affect patient health.

How the ethical problem can be solved?

The four principles of bioethics can be used to ensure an ethical AI solution for the healthcare problem.

- **Respect for autonomy:** Enabling users to be fully aware of decision-making. E.g., users of an AI algorithm should know how it functions.
- **Do not harm:** Harm to anyone (be it human or non-human) must be avoided at all costs. If no choice is available path of least harm must be always chosen.
- **Maximum benefit:** Not only should we avoid harm our actions must focus on providing the maximum benefit possible.
- **Justice:** All benefits and burdens of a particular choice must be distributed in a justified manner across people irrespective of their background.