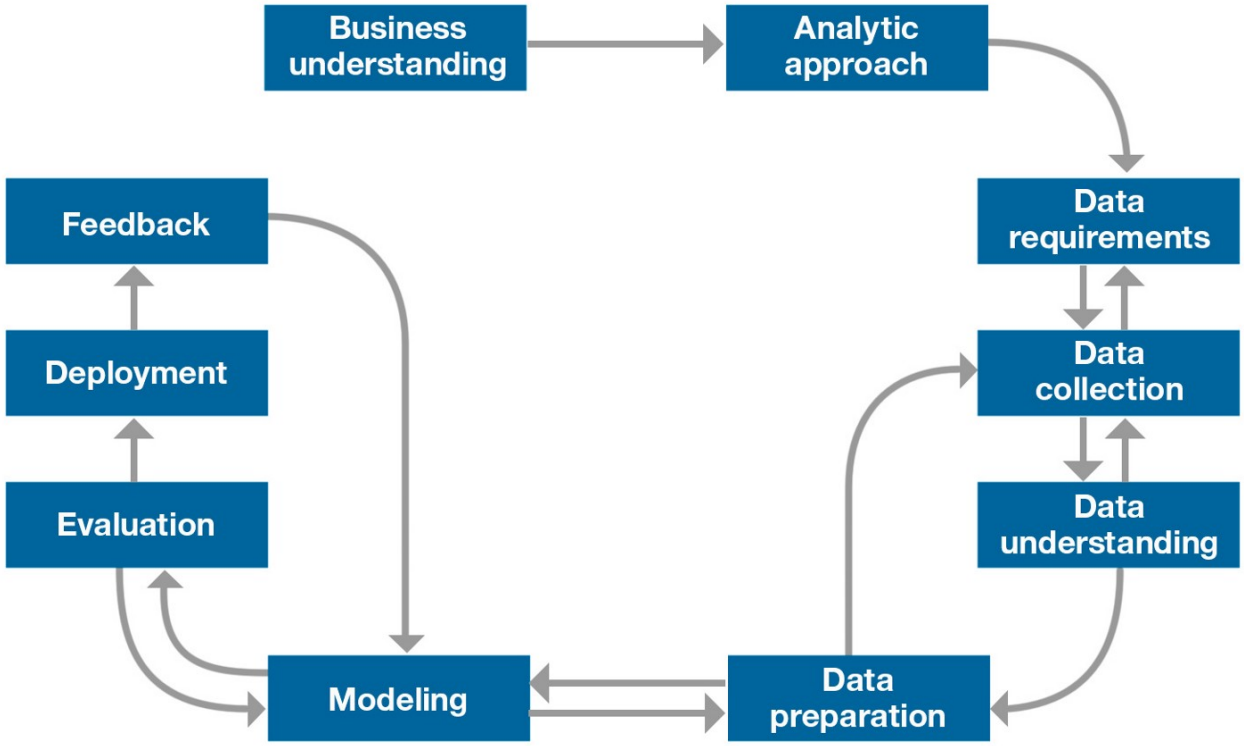
10 Steps of Data Science Methodology

Methodology in Data Science is the best way to organize your work, doing it better, and without losing time. Data Science Methodology is composed of 10 parts:



1. Business Understanding

- For any **project or problem-solving**, the **first** stage is always understanding the business.
- This involves **defining** the **problem**, project objectives, and requirements of the solutions.
- This step plays a critical role in defining **how the project will develop**.
- A thorough discussion with the clients, understanding how their business works, requirements from the product or service, and clarifying each aspect of the problem can take time and prove to be laborious, but it is a necessity.

- The **Business Understanding** stage is crucial because it helps to clarify the goal of the customer. In this stage, we have to ask a lot of questions to the customer about every single aspect of the

problem; in this manner, we are sure that we will study data related, and at the end of this stage, we will have a list of **business requirements**.

2. Analytic Approach

- After the **problem** has been **clearly** defined, the **analytical approach** which will be used to solve the problem can be defined.
- This means expressing the problem in the framework of **statistical** and machine learning techniques.
- There are **different models** that can be used and it depends on the type of outcome needed.
- Statistical analysis can be used if it requires **summarising**, counting, finding trends in the data.
- To assess the relationships between various elements and the environment and how they affect each other, a descriptive model can be used.
- And for predicting the possible outcomes or calculating the probabilities, a predictive model can be used which is a data mining technique.
- A training set that is a set of historical data that includes its outcomes, is used for predictive modeling.

3. Data Requirements

The analytical approach chosen in the previous stage defines the kind of data needed to solve the problem. This step identifies the data contents, formats, and the sources for data collection. The data selected should be able to answer all the ‘what’, ‘who’, ‘when’, ‘where’, ‘why’ and ‘how’ questions about the problem.

in the stage where we identify the necessary data content, formats, and sources for initial data collection, and we use this data inside the algorithm of the approach we chose

4. Data Collection

In the fourth stage, the data scientist identifies all the data resources and collects data in all forms such as structured, unstructured, and semi-structured data that is relevant to the problem. Data is available

on many websites and there are premade datasets that can also be used.
At times, if there is a requirement for important data that is not accessible freely, certain investments need to be made in order to obtain such datasets. If later there are any gaps identified within the collected data that is hindering the project development, the data scientist has to revise the requirements and collect more data.
The more the data acquired, the better the models will be built that can produce more effective outcomes.

5. Data Understanding

In this stage, the data scientist tries to understand the data collected. This involves applying descriptive analysis and visualization techniques to the data. This will help in a better understanding of the data content and the quality of the data and developing initial insights from the data. If there are any gaps identified in this step, the data scientist can go back to the previous step and gather more data.

6. Data Preparation

This stage comprises all the activities needed to construct the data to make it suitable to be used for the modeling stage. This includes data cleaning i.e. managing missing data, deleting duplicates, changing the data into a uniform format, etc., combining data from various sources, and transforming data into useful variables.
This is one of the most time-consuming steps. However, there are automated methods available today that can accelerate the process of data preparation. At the end of this stage, only the data needed to solve the problem is retained to make the model run smoothly with minimal errors.

7. Modeling

The dataset prepared in the previous stage is used for creating the modeling stage. Here the type of model to be used is defined by the approach decided upon in the analytical approach stage. Thus, the kind of dataset varies depending on whether it is a descriptive, predictive approach or a statistical analysis.
This is one of the most iterative processes in the methodology as the data scientist will use multiple algorithms to arrive at the best model for the chosen variables. It also involves combining various business

insights that are continuously being discovered which leads to refining the prepared data and model.
for example, a predictive model might be used to determine whether an email is a spam or not. For predictive modeling, data scientists use a **training set** that is a set of historical data in which the outcomes are already known. This step can be repeated more times until the model understands the question and answer to it.

8. Evaluation

The data scientist evaluates the quality of the model and ensures that it meets all the requirements of the business problem. This involves the model undergoing various diagnostic measures and statistical significance testing. It helps in interpreting the efficacy with which the model arrives at a solution.

9. Deployment

Once the model has been developed and approved by the business clients and other stakeholders involved, it is deployed into the market. It could be deployed to a set of users or into a test environment. Initially, it might be introduced in a limited way, until it is tested completely and been successful in all its aspects.

10. Feedback

The last stage in the methodology is feedback. This includes results collected from the deployment of the model, feedback on the model's performance from the users and clients, and observations from how the model works in the deployed environment.
Data scientists analyze the feedback received, which helps them refine the model. It is also a highly iterative stage as there is a continuous back and forth between the modeling and feedback stages. This process continues till the model is providing satisfactory and acceptable results.