# BIGDATA ANALYTICS

## Per Minute Data Generated


## The Sources of Big Data

1. **Black Box Data**

   **This is the data generated by airplanes, including jets and helicopters. Black box data includes flight crew voices, microphone recordings, and aircraft performance information.**

2. **Social Media Data**

   **This is data developed by such social media sites as Twitter, Facebook, Instagram, Pinterest, and Google+.**

3. **Stock Exchange Data**

   **This is data from stock exchanges about the share selling and buying decisions made by customers.**

4. **Power Grid Data**

   **This is data from power grids. It holds information on particular nodes, such as usage information.**

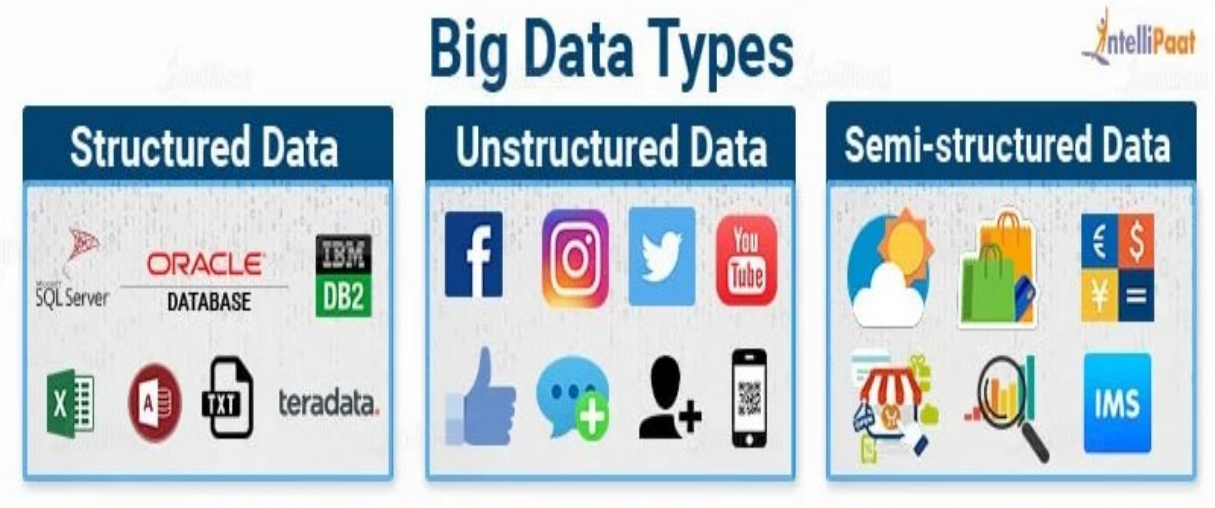
5. **Transport Data**

   **This includes possible capacity, vehicle model, availability, and distance covered by a vehicle.**

6. **Search Engine Data**

   **This is one of the most significant sources of big data. Search engines have vast databases where they get their data.**

Big Data Types



# The six Vs of big data

Big data is a collection of data from various sources, often characterized by what's become known as the 3Vs: *volume, variety and velocity*. Over time, other Vs have been added to descriptions of big data:

| VOLUME | VARIETY | VELOCITY | VERACITY | VALUE | VARIABILITY |
|---|---|---|---|---|---|
| The amount of data from myriad sources. | The types of data: structured, semi-structured, unstructured. | The speed at which big data is generated. | The degree to which big data can be trusted. | The business value of the data collected. | The ways in which the big data can be used and formatted. |






**Big Data analytics is the process of collecting, organizing and analyzing large sets of data (*called* Big Data) to discover patterns and other useful information. Big Data analytics can help organizations to better understand the information contained within the data and will also help identify the data that is most important to the business and future business decisions. Analysts working with Big Data typically want the *knowledge* that comes from analyzing the data.**

## Types:

- **Descriptive Analytics** tells you what happened in the past.
- **Diagnostic Analytics** helps you understand why something happened in the past.
- **Predictive Analytics** predicts what is most likely to happen in the future.
- **Prescriptive Analytics** recommends actions you can take to affect those outcomes.

# What is Descriptive Analytics?

**Descriptive analytics** looks at data statistically to tell you what happened in the past. Descriptive analytics helps a business understand how it is performing by providing context to help stakeholders interpret information. This can be in the form of data visualizations like graphs, charts, reports, and dashboards.

How can descriptive analytics help in the real world? In a healthcare setting, for instance, say that an unusually high number of people are admitted to the emergency room in a short period of time. Descriptive analytics tells you that this is happening and provides real-time data with all the corresponding statistics (date of occurrence, volume, patient details, etc.).

### Examples of Descriptive Analytics

Here are some common applications of Descriptive Analytics:

- Summarizing past events such as regional sales, customer attrition, or success of marketing campaigns.
- Tabulation of social metrics such as Facebook likes, Tweets, or followers.
- Reporting of general trends like hot travel destinations or news trends.

# What is Diagnostic Analytics?

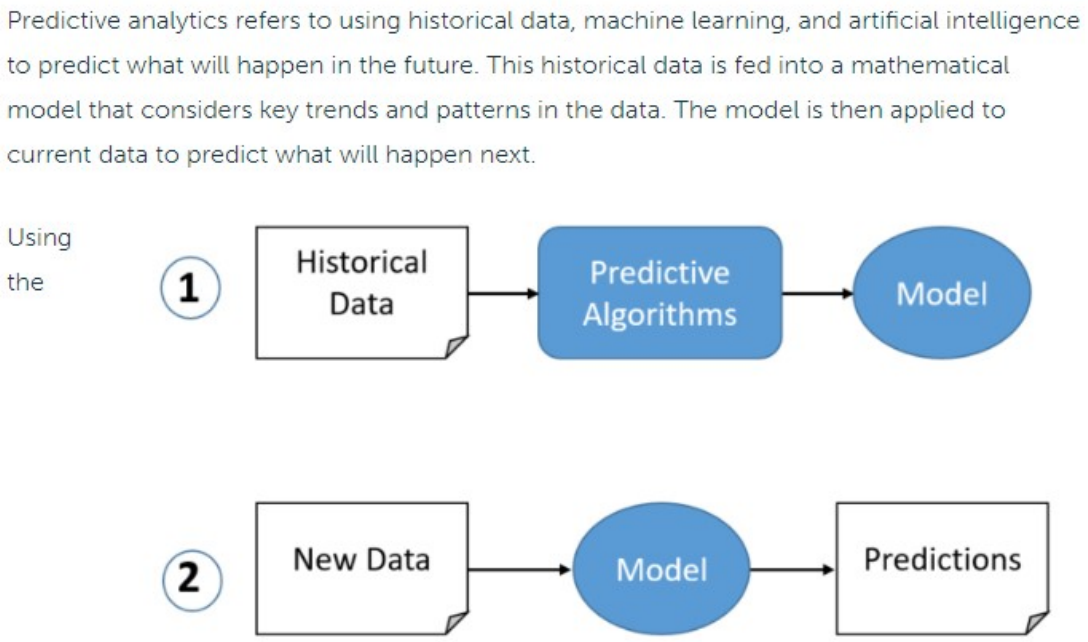
**Diagnostic analytics** takes descriptive data a step further and provides deeper analysis to answer the question: Why did this happen? Often, diagnostic analysis is referred to as root cause analysis. This includes using processes such as data discovery, data mining, and drill down and drill through.

In the healthcare example mentioned earlier, diagnostic analytics would explore the data and make correlations. For instance, it may help you determine that all of the patients' symptoms—high fever, dry cough, and fatigue—point to the same infectious agent. You now have an explanation for the sudden spike in volume at the ER.

## What is Predictive Analytics?

**Predictive analytics** takes historical data and feeds it into a machine learning model that considers key trends and patterns. The model is then applied to current data to predict what will happen next.

Back in our hospital example, predictive analytics may forecast a surge in patients admitted to the ER in the next several weeks. Based on patterns in the data, the illness is spreading at a rapid rate.




# Examples of Predictive Analytics

Each industry and sector puts predictive analytics to work in different ways. We break them down by industry and use case.

### Retail

Probably the largest sector to use predictive analytics, retail is always looking to improve its sales position and forge better relations with customers. One of the most ubiquitous examples is Amazon's recommendations. When you make a purchase, it puts up a list of other similar items that other buyers purchased.

Much of this is in the pre-sale area – with things like sales forecasting and market analysis, customer segmentation, revisions to business models, aligning IT to business units, managing inventory to account for seasonality, and finding best retail locations. But it also acts post-sale, acting to reduce returns, get the customer to come back and extend warranty sales.

## Health

One early attempt at this was Google Flu Trends (GFT). By monitoring millions of users' health tracking behaviors online and comparing it to a historic baseline level of influenza activity for a corresponding region, Google hoped to predict flu patterns. But its numbers proved to be way overstated, owing to less than ideal information from users.

But there are other uses, such as predicting epidemics or public health issues based on the probability of a person suffering the same ailment again. Or predicting the chances of a person with known illness ends up in Intensive Care due to changes in environmental conditions. It can also predict when and why patients are readmitted and when a patient needs behavioral health care as well.

## Sports

The most famous example is Bing Predicts, a prediction system by Microsoft's Bing search engine. It has scored in the 80 percentile for singing contests like American Idol, the high 90s percentage in U.S. House and Senate races, and went 15 for 15 in the 2014 World Cup. It uses statistics and social media sentiment to make its assessments.

Another example is what's known as "Moneyball," based on a book about how the Oakland Athletics baseball team used analytics and evidence-based data to assemble a competitive team. It abandoned old predictors of success, such as runs batted in, for overlooked ones, like on-base. It took the Athletics to two consecutive playoffs.

## Weather

Weather forecasting has improved by leaps and bounds thanks to predictive analytics models. Today's five-day forecast is as accurate as a one-day forecast from the 1980s. Forecasts as long as nine to 10 days are now possible, and more important, 72-hour predictions of hurricane tracks are more accurate than 24-hour forecasts from 40 years ago.

The extreme polar vortex that dropped temperatures in Wisconsin and Minnesota to -50 degrees Fahrenheit was predicted several days out. All of this is done thanks to satellites monitoring the land and atmosphere. They feed that data into models that better represent our atmospheric and physical systems.

## Insurance/Risk Assessment

Despite some awful disasters in 2017, insurance firms lessened losses within risk tolerances, thanks to predictive analytics. It helped them set competitive prices in underwriting, analyze and estimate future losses, catch fraudulent claims, plan marketing campaigns, and provide better insights into risk selection.

## Financial modeling

Predictive modeling for financial services help optimize the overall business strategy, revenue generation, resource optimization, and generating sales. Automated financial services analytics can allow firms to run thousands of models simultaneously and deliver faster results than with traditional modeling.

It does this by analyzing strategic business investments, improve daily operations, increase productivity, and predicting changes to the current and future marketplace. The more common form of predictive analytics in financial services is the credit scoring system used to approve or deny loans, often within minutes.

## Energy

Analytics in power plants can reduce unexpected equipment failures by predicting when a component might fail, thus helping reduce maintenance costs and improve power availability.

Utilities can also predict when customers might get a high bill and send out customer alerts to warn customers they are running up a large bill that month. Smart meters allowed utilities to warn customers of spikes at certain times of the day, helping them to know when to cut back on power use.

## Social Media Analysis

Online social media is a fundamental shift of how information is being produced, particularly as relates to businesses. Tracking user comments on social media outlets enables companies to gain immediate feedback and the chance to respond quickly.

Nothing makes a local business jump like a bad review on Yelp, or makes a merchant respond like a bad review on Amazon. This means collecting and sorting through massive amounts of social media data and creating the right models to extract the useful data.

## Alerting and Monitoring

This covers a wide range. Just in transportation, modern automobiles have more than 100 sensors and some are rapidly approaching 200 sensors. This gives a much more accurate report than the old generic Check Engine light.

Modern aircraft have close to 6,000 sensors that generating more than 2TB of data per day, which cannot be analyzed by human beings with any expedience. Machine learning to recognize normal behavior as well as signs leading up to failure can help predict a failure long before it happens.

### Internet of Things

IDC estimates less than 1 percent of data generated today is being analyzed, and that flood will only increase as more IoT devices come online, such as smart cars.

Predictive analytics are needed to help sort what's coming in to weed out useless data and find what you need to take intelligent actions. In one example, Cisco and Rockwell Automation helped a Japanese automation equipment maker reduce down time of its manufacturing robots to near zero by applying predictive analytics to operational data.

## What is Prescriptive Analytics?

**Prescriptive analytics** takes predictive data to the next level. Now that you have an idea of what will likely happen in the future, what should you do? It suggests various courses of action and outlines what the potential implications would be for each.

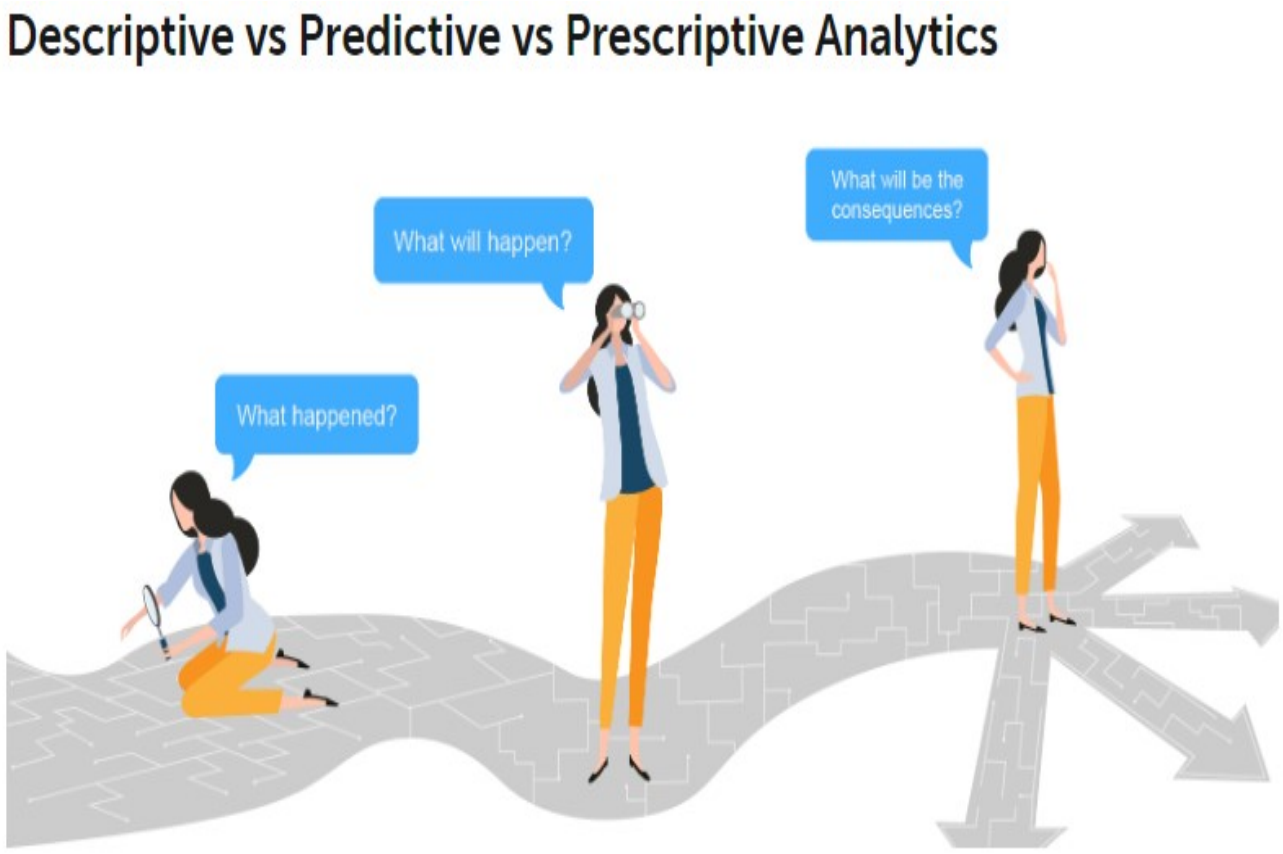
Back to our hospital example: now that you know the illness is spreading, the prescriptive analytics tool may suggest that you increase the number of staff on hand to adequately treat the influx of patients.

## Benefits of prescriptive analytics

If you're a senior executive, looking to further optimize the efficiency and success of your organization's operations is always top of mind. Prescriptive analytics is the smartest and most efficient tool available to scaffold any organization's business intelligence. Prescriptive analytics affords organizations the ability to:

- **Effortlessly map the path to success**. Prescriptive analytic models are designed to pull together data and operations to produce the roadmap that tells you what to do and how to do it right the first time. Artificial intelligence takes the reins of business intelligence to apply simulated actions to a scenario to produce the steps necessary to avoid failure or achieve success.
- **Inform real-time and long-term business operations**. Decision makers can view both real-time and forecasted data simultaneously to make decisions that support sustained growth and success. This streamlines decision making by offering specific recommendations.
- **Spend less time thinking and more time doing**. The instant turnaround of data analysis and outcome prediction lets your team spend less time finding problems and more time designing the perfect solutions. Artificial intelligence can curate and process data better than your team of data engineers and in a fraction of the time.

- **Reduce human error or bias**. Through more advanced algorithms and machine learning processes, predictive analytics provides an even more comprehensive and accurate form of data aggregation and analysis than descriptive analytics, predictive analytics, or even individuals.

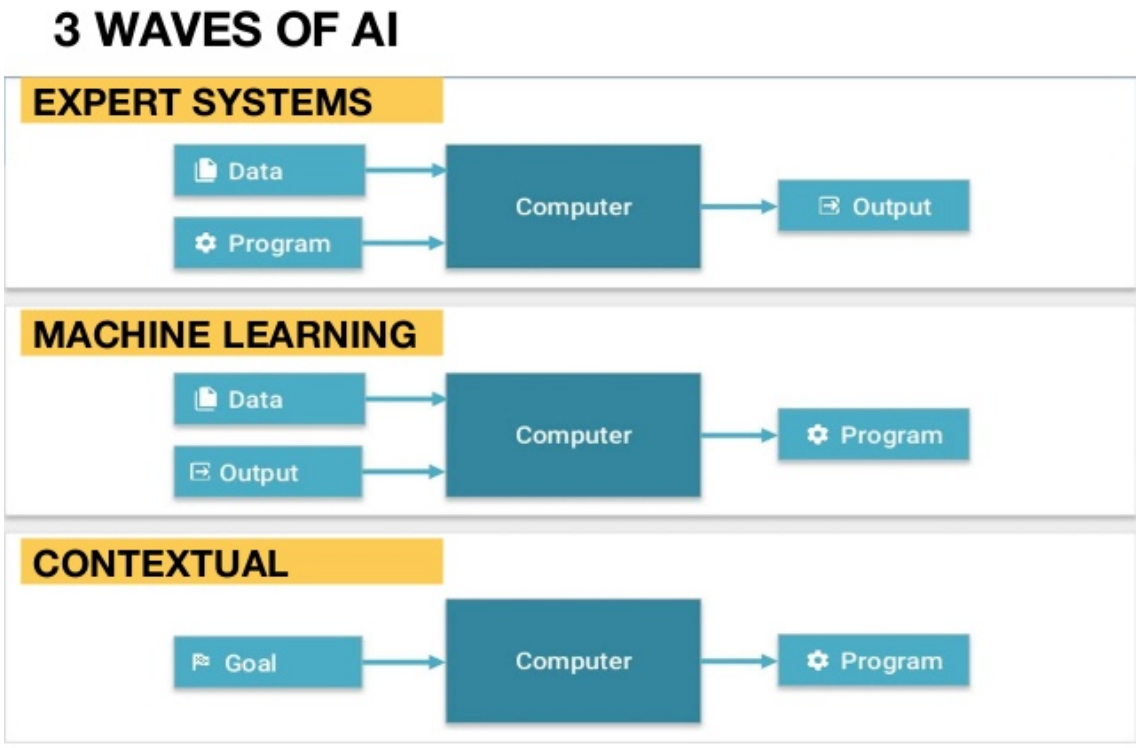


## Diagnostic vs. Descriptive vs. Predictive vs. Prescriptive Analytics

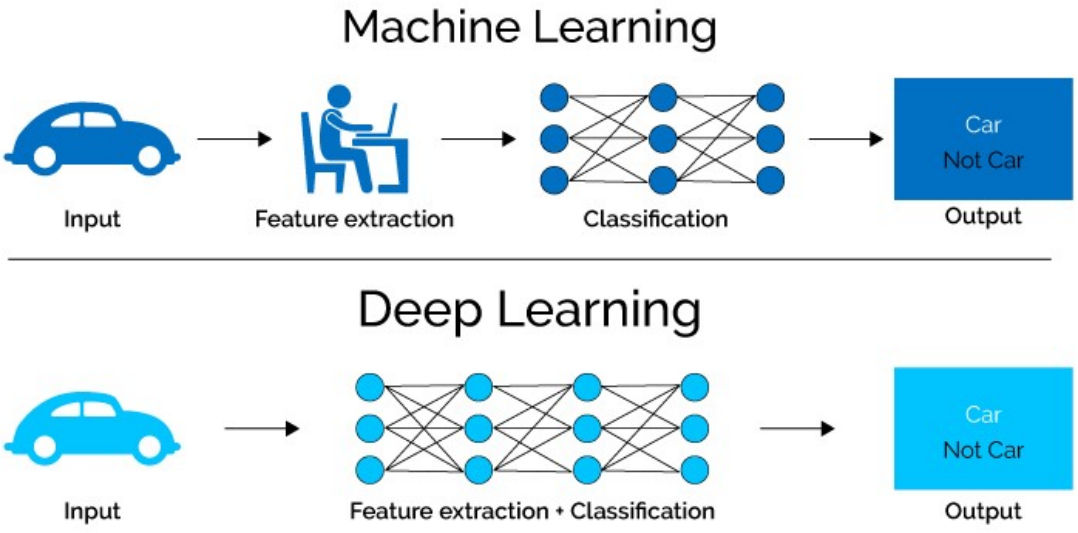
The four main types of advanced analytics have some similarities, but are mainly defined by their differences. Here is a summary of how they operate:

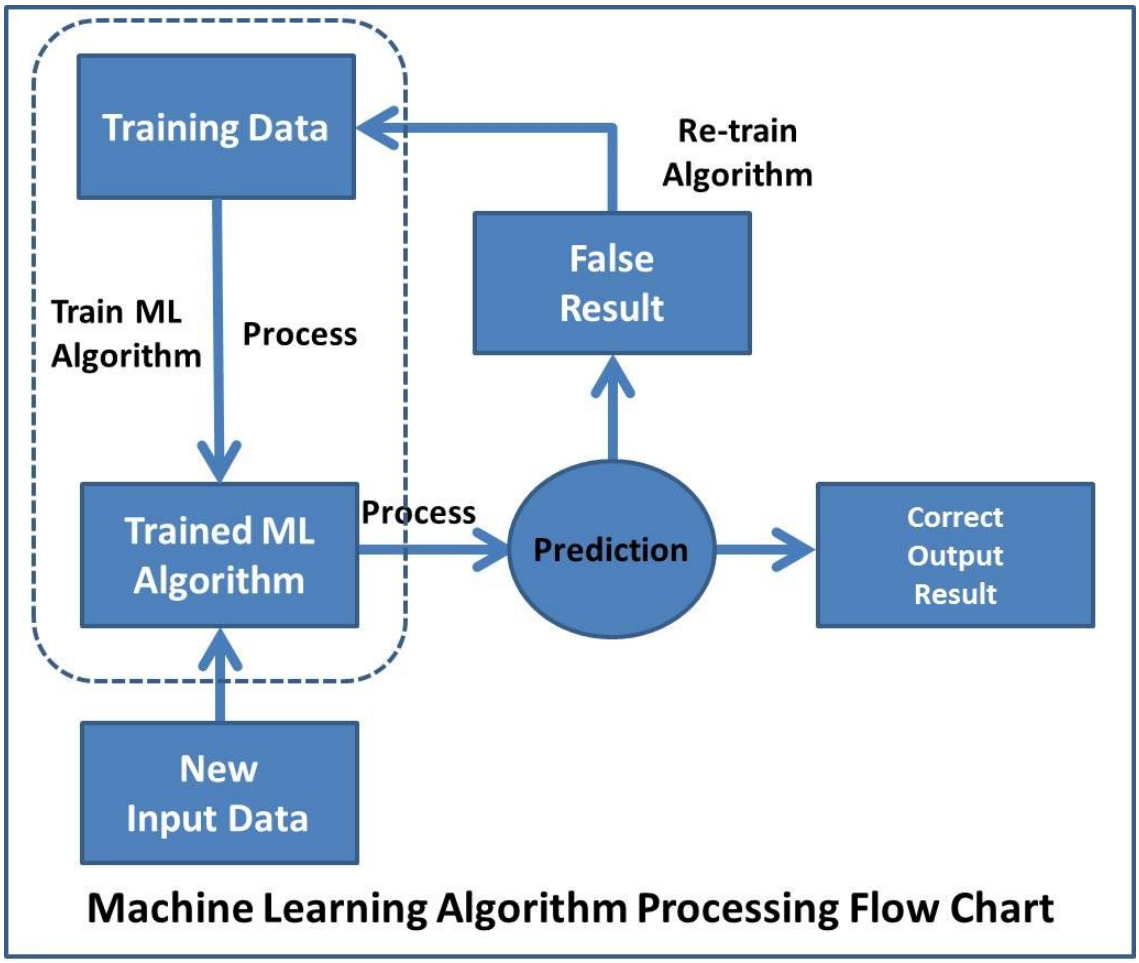
| Diagnostic | Descriptive | Predictive | Prescriptive |
|---|---|---|---|
| Uses historical data | Uses historical data | Uses historical data | Uses historical data |
| Identifies data anomalies | Reconfigures data into easy-to-read formats | Fills in gaps in available data | Estimates outcomes based on variables |
| Highlights data trends | Describes the state of your business operations | Creates data models | Offers suggestions about outcomes |
| Investigates under-lying issues | Learns from the past | Forecasts potential future outcomes | Uses algorithms, AI and machine leanring |
| Answers "Why" Questions | Answer "What" Questions | Answers "What Might Happen?" | Answers "If, Then" Questions |

# Machine Learning

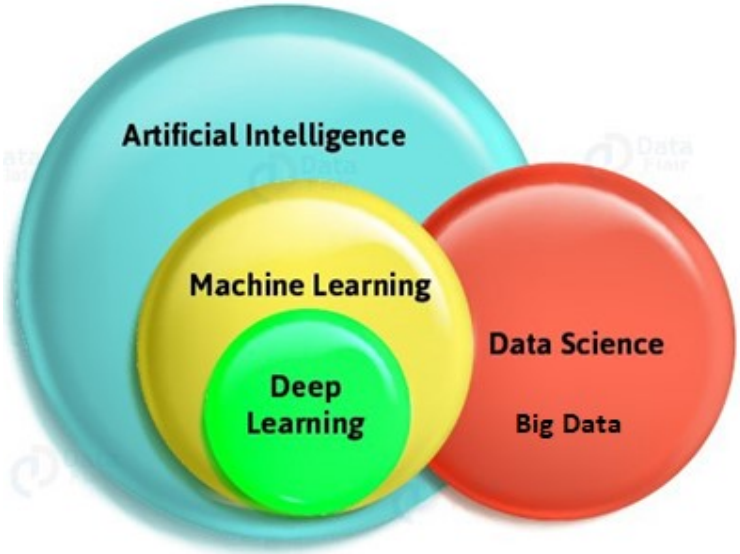


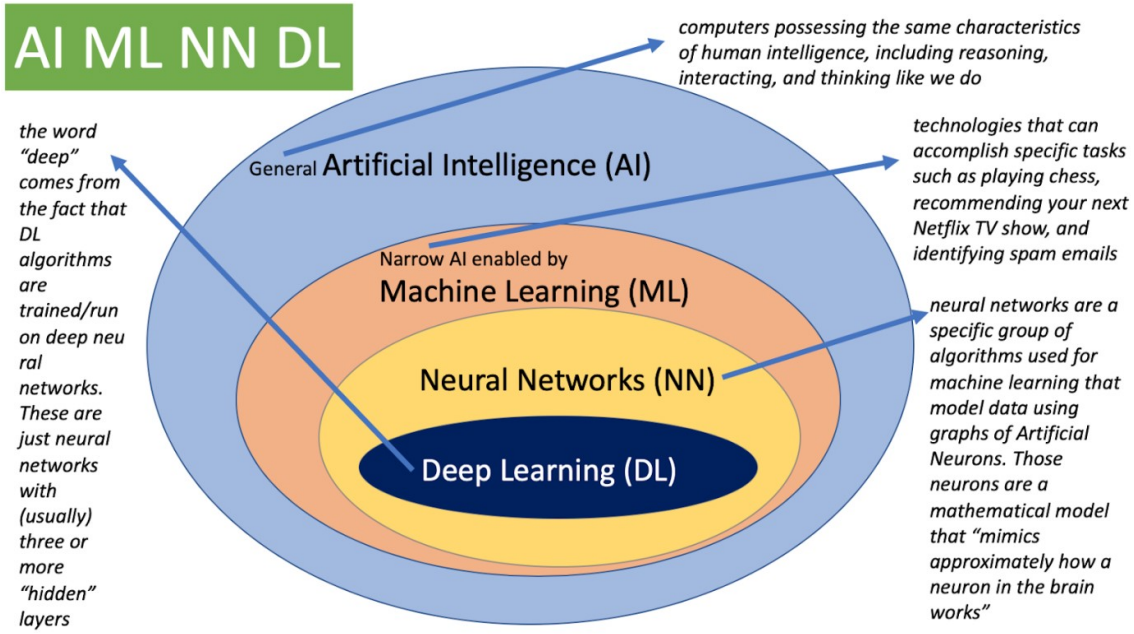

/slash 28

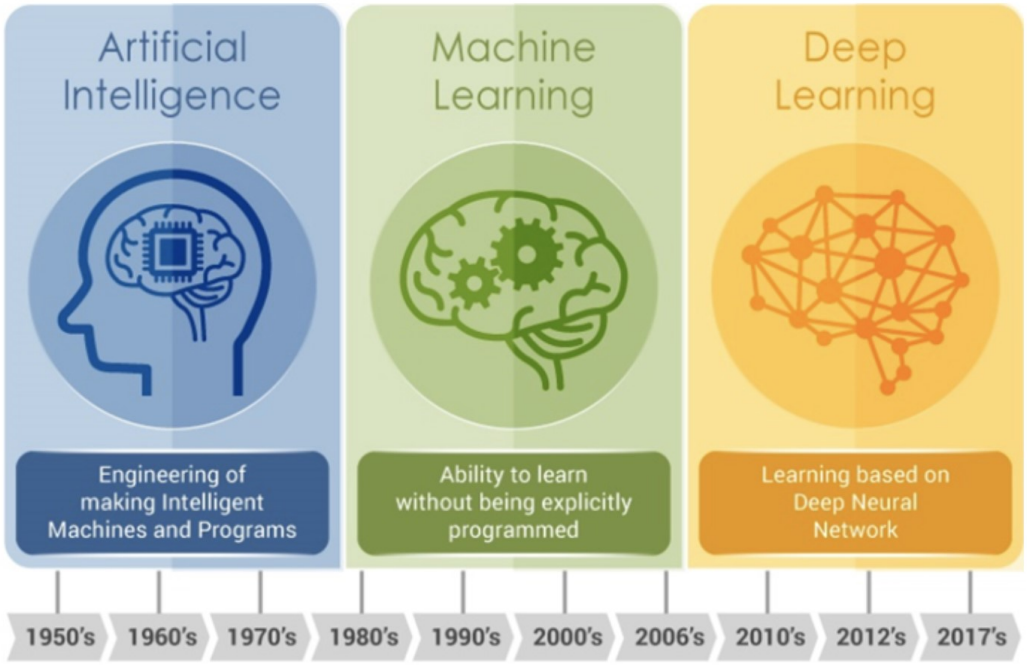





Machine Learning Algorithm Processing Flow Chart






Evolution of AI — Source: https://www.embedded-vision.com/

# Do Visit this site

https://data-flair.training/blogs/artificial-intelligence-vs-machine-learning-vs-dl-vs-ds/