Digital Fluency

Preamble

After looking at the market needs, the Digital Fluency course is designed to bring you closer to fulfilling the scale gap. The learning from this course will help you gain competitive advantage and to showcase your conceptual understanding of some of the most in-demand technologies like AI, BDA and IoT. At the same time, demonstrate that you are equally focused on building essential soft skills, which are much needed for professional success.

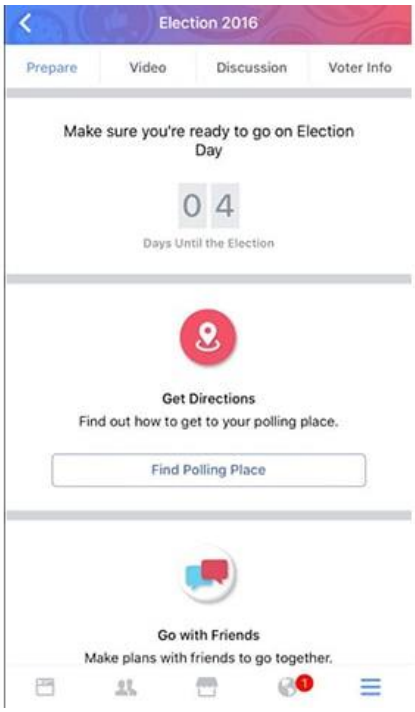
1. Context

"I Voted" – sticker/badge by Facebook

Facebook successfully tied the political activity to user engagement when they came out with a social experiment by creating a sticker allowing its users to declare "I Voted" on their profiles.

This experiment ran during the 2010 midterm elections and seemed useful. Users who noticed the button were likely to vote and be vocal about the behavior of voting once they saw their friends were participating in it. Out of a total of 61 million users, then, 20% of the users who saw their friends voting, also clicked the sticker. The Data science unit at Facebook has claimed that with the combination of their stickers that motivated close to 60,000 voters directly, and the social contagion, which prompted 280,000 connected users to vote for a total of 340,000 additional voters in the midterm elections.

For the 2016 elections, Facebook expanded its involvement into the voting process with reminders and directions to users' polling places.



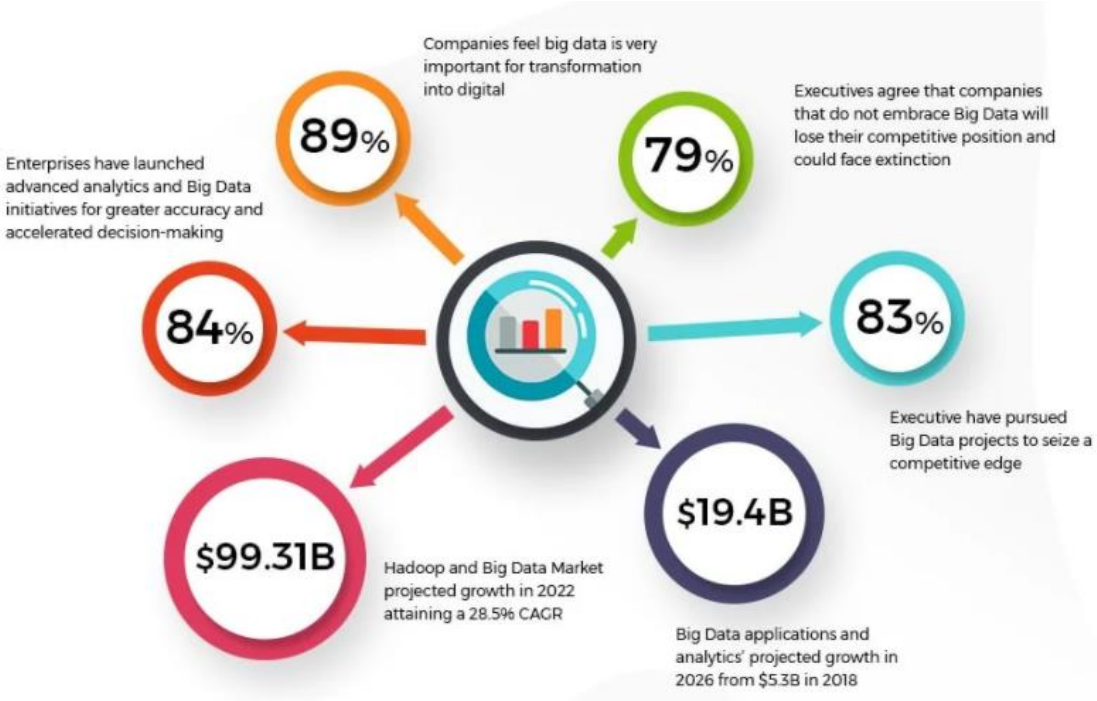
2. Key Concepts

Big Data Analytics

After completing this pathway, you will:

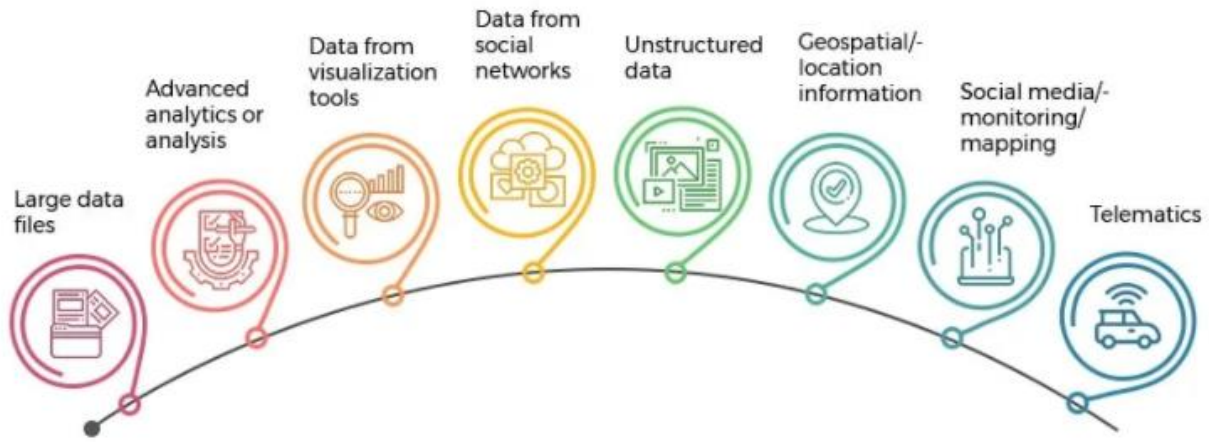
- Understand the importance of Big Data Analytics (BDA) in different fields
- Get an overview of the concepts of BDA
- Learn how to perform data analysis in Excel using pivot tables and pivot charts

Big Data Analytics – Introduction

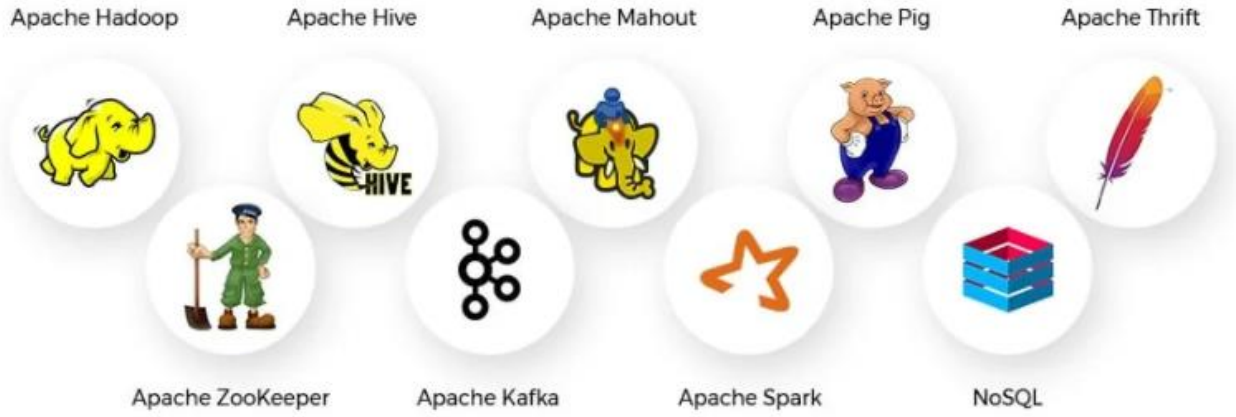


Data Analytics Process

Sources of Big Data

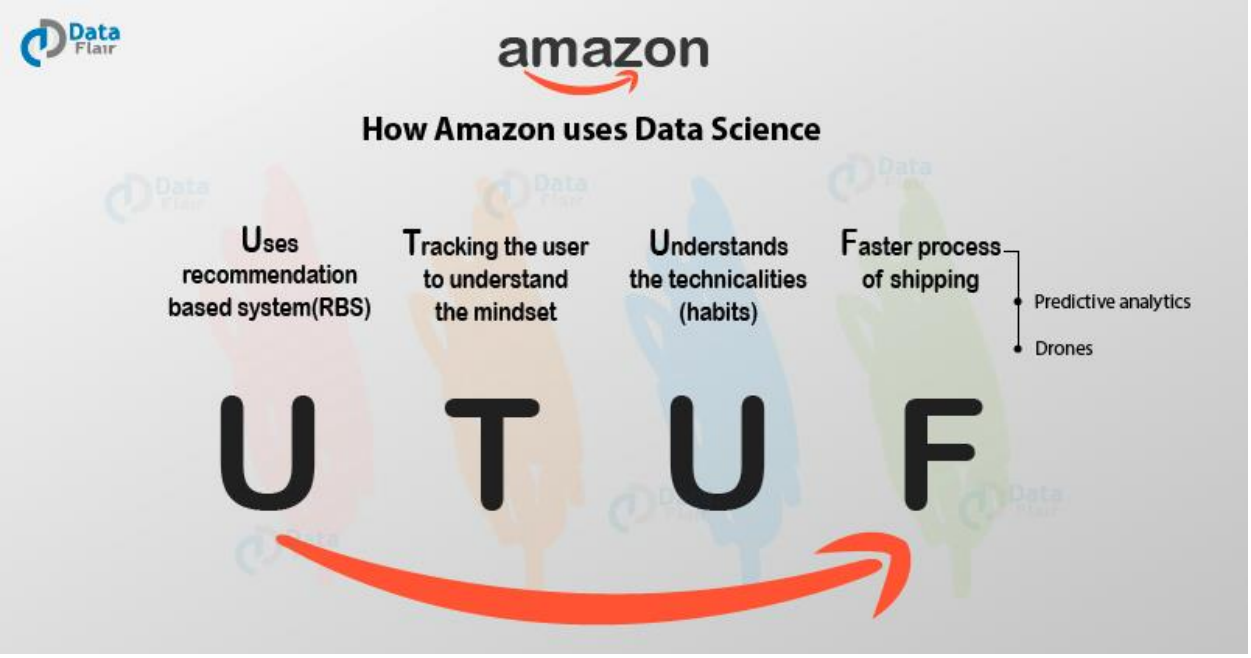


Big Data Tools and Technologies



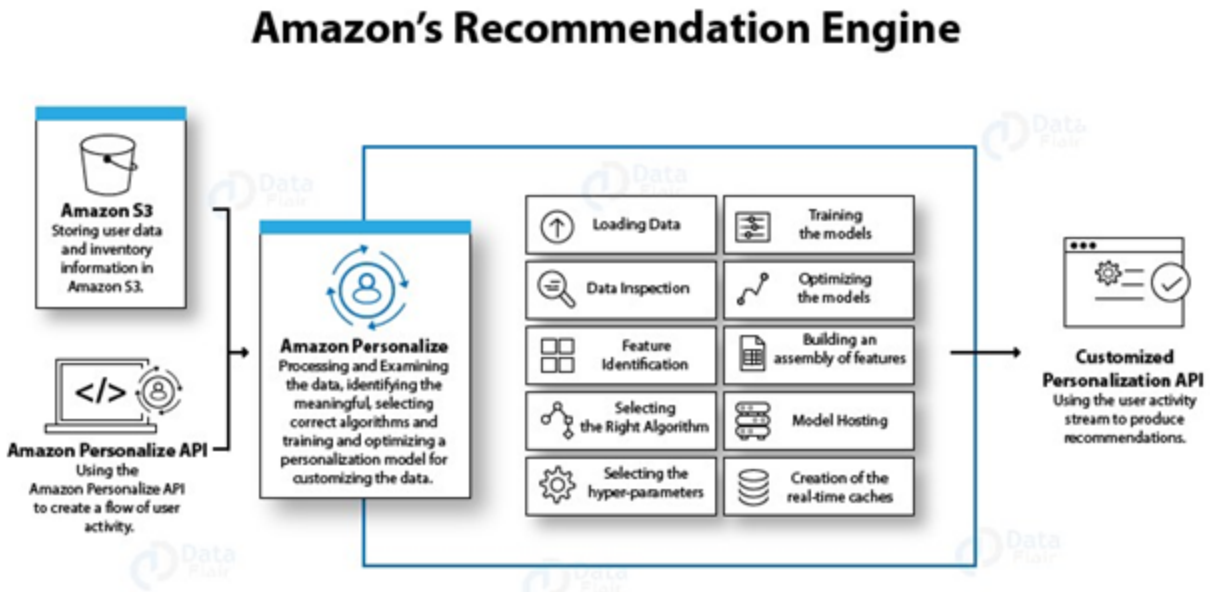
3. Case Study

How Amazon uses Data Science



Uses recommendation-based system (RBS)

Through this technology, it gathers data from their customers (Can also be called Big Data). The more data they have the better it is for them because once they understand what the user wants, they then streamline the process and try to encourage the customers to purchase the products. RBS seeks and predicts the “rating” or “preference” a user would give to an item.



Database Management for Data Science

After completing this Pathway, you will:

1. Explain Database and its different types
2. Advantages of Database

Introduction to Data

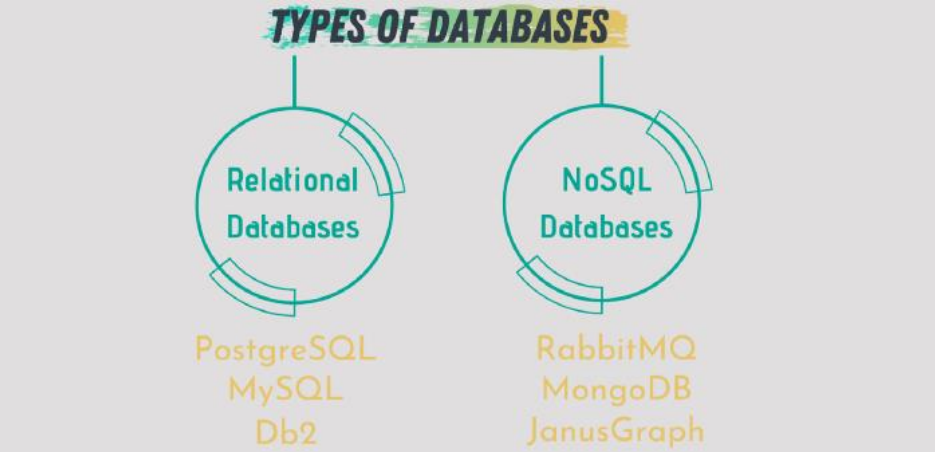
Data are individual facts, statistics, or items of information, often numeric, that are collected through observation. In a more technical sense, data are a set of values of qualitative or quantitative variables about one or more persons or objects, while a datum is a single value of a single variable.

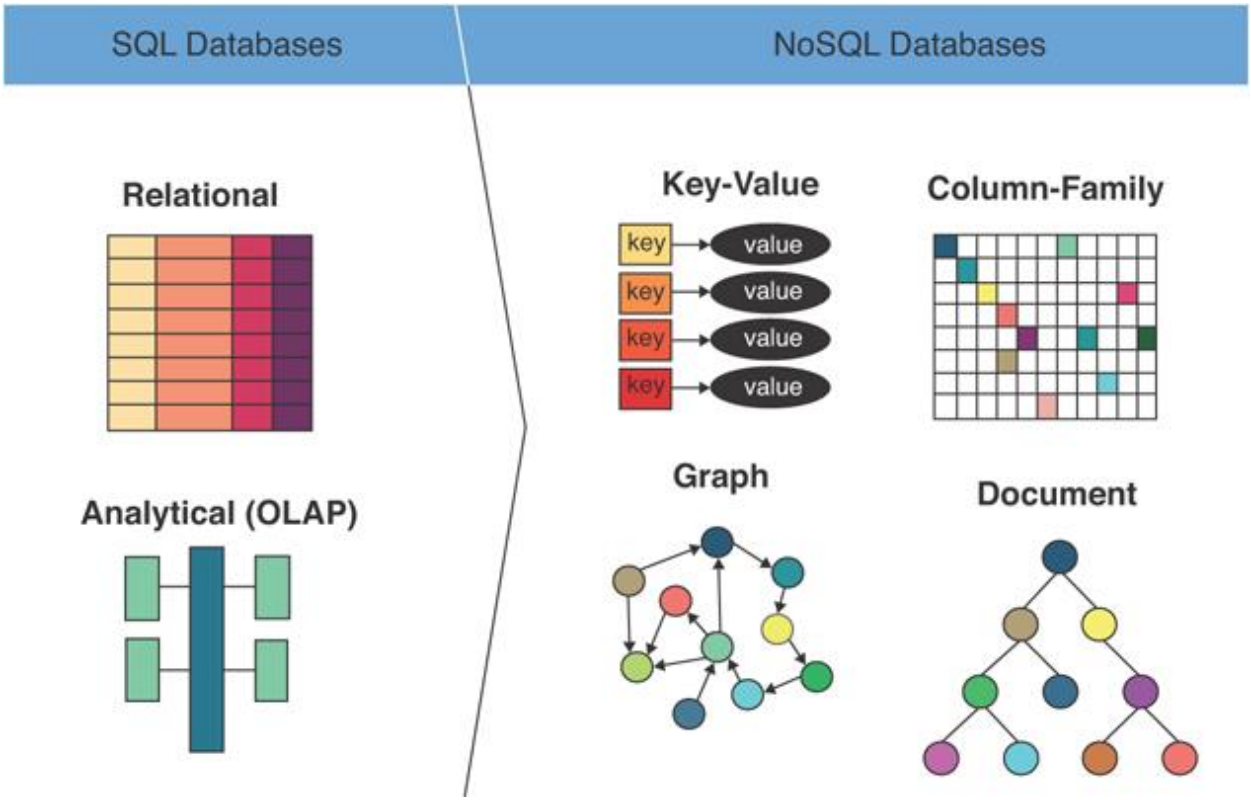
Definition of Database

A database is defined as a structured set of data held in a computer's memory or on the cloud that is accessible in various ways.

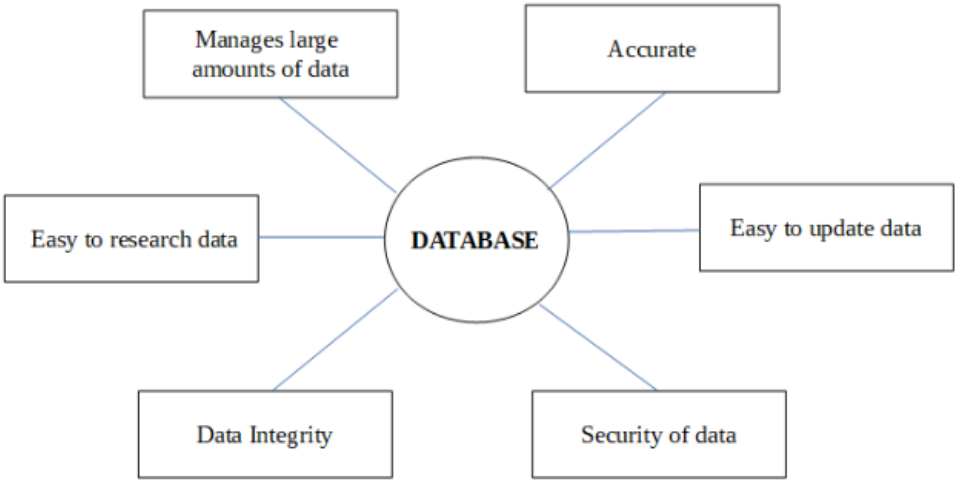
Database Management Systems (DBMS) refer to the technology solution used to optimize and manage the storage and retrieval of data from databases.

Types of database





Why use databases (Advantages)?



4. Lab Session

Visualization of data using Excel/spreadsheet:

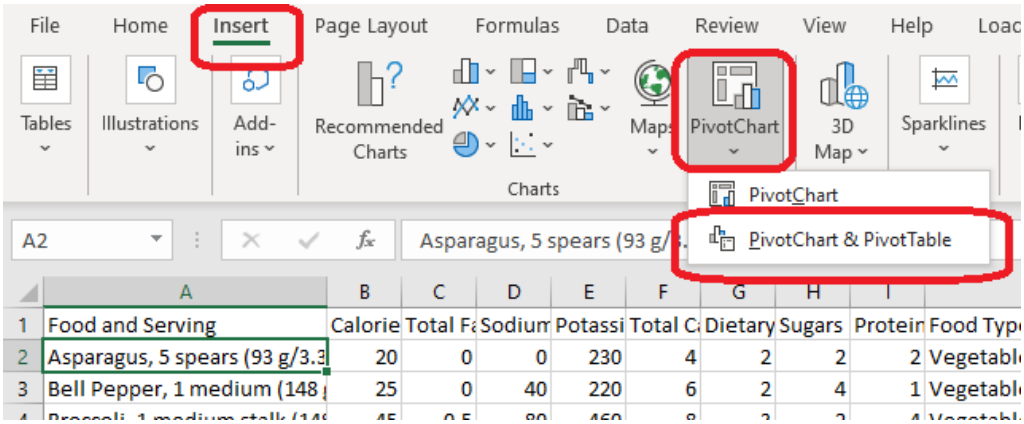
A Pivot Table is a powerful tool to calculate, summarize, and analyze data that lets you see comparisons, patterns, and trends in your data. PivotTables work a little bit differently depending on what platform you are using to run Excel.

Sometimes it's hard to see the big picture when your raw data hasn't been summarized. Your first instinct may be to create a PivotTable, but not everyone can look at numbers in a table and quickly see what's going on. Pivot Charts are a great way to add data visualizations to your data.

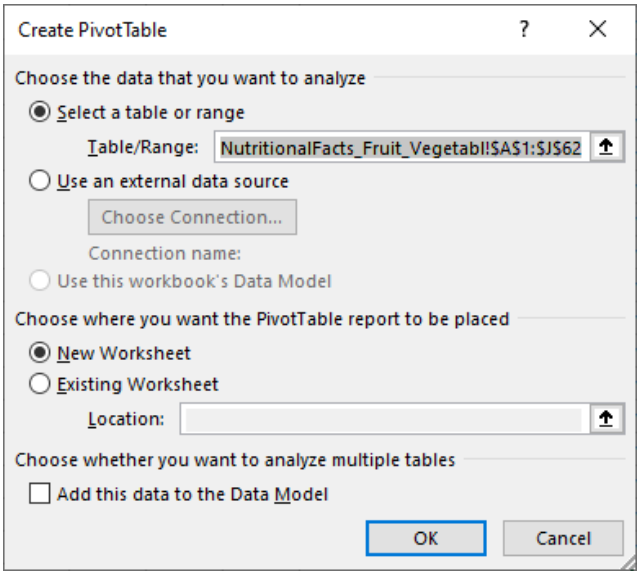
Data set:

Let us take a data set of nutritional facts of fruits, vegetables and seafood as an example and build a Pivot Table and Pivot Chart.

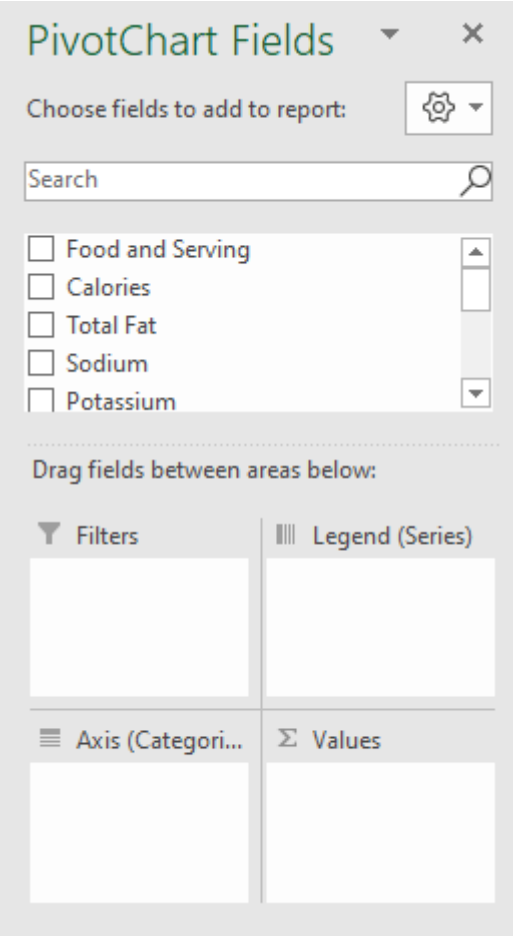
1. Download the data set.
2. Select a cell in the Excel.
3. Click Insert → PivotChart → PivotChart & PivotTable.



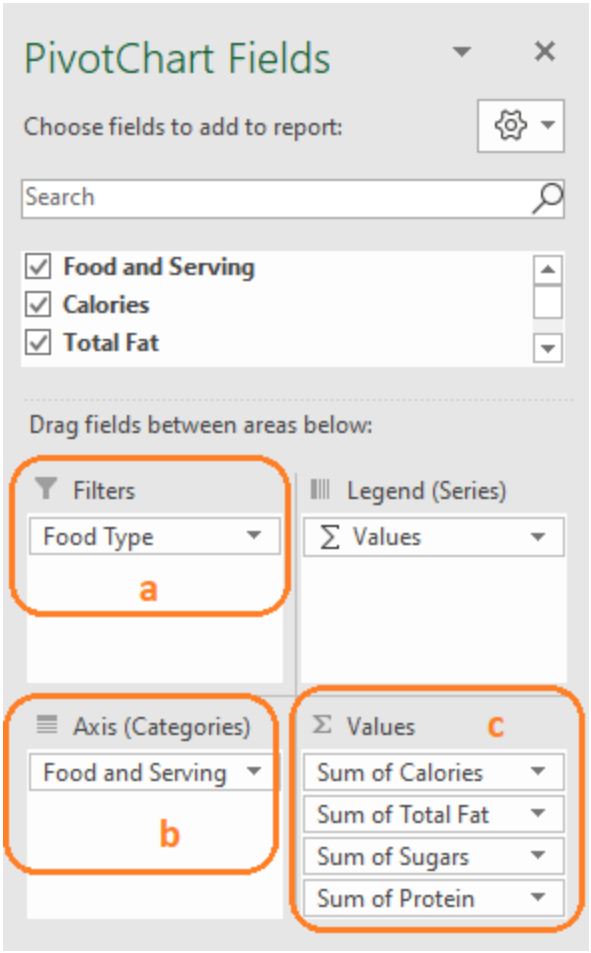
4. Under **Choose the data that you want to analyze**, select **Select a table or range**.



5. In **Table/Range**, verify the cell range.
6. Under **Choose where you want the PivotTable report to be placed**, select **New worksheet** to place the PivotTable in a new worksheet or **Existing worksheet** and then select the location you want the PivotTable to appear.
7. Select **OK**.
   New sheet gets created and **PivotChart Fields** pane is displayed.

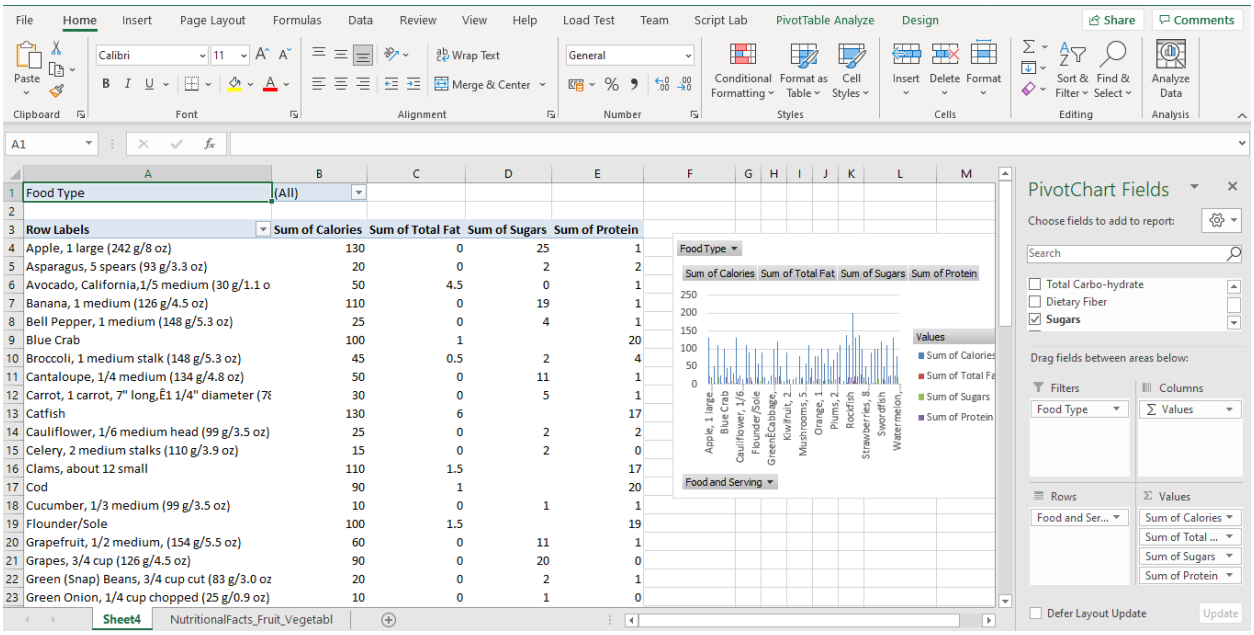


8. Drag and drop the required fields as appropriate. In this example, drag and drop:
   a. **Food Types** to the **Filters**
   b. **Food and Serving** to the **Rows**
   c. **Calories, Total Fat, Sugars,** and **Proteins** to the **Values**.



Note: **Values** gets automatically added to **Legend (Series)**.

9. You can see the Pivot Table and Pivot Chart as shown below.



Note: Appropriate filter can be selected under **Food Types** to visualize the different types of food.

5. Frequently Asked Questions

1. What is data science?

Data science is an interdisciplinary field that uses scientific methods, processes, algorithms and systems to extract knowledge and insights from noisy, structured and unstructured data, and apply knowledge and actionable insights from data across a broad range of application domains.

2. What is the need for Data Science?

The reason why we need data science is the ability to process and interpret data. This enables companies to make informed decisions around growth, optimization, and performance. Demand for skilled data scientists is on the rise now and in the next decade.

3. What is Data Science useful for?

Data science is a process that empowers better business decision-making through interpreting, modeling, and deployment. This helps in visualizing data that is understandable for business stakeholders to build future roadmaps and trajectories. Implementing Data Science for businesses is now a mandate for any business looking to grow.

4. How Facebook Uses Data Analytics To Understand Your Posts?

With 1.2 billion people uploading 136,000 photos and updating their status 293,000 times per minute on Facebook, it contributes to unstructured data (information which isn't easily quantified and put into rows and tables for computer analysis).

Textual analysis - A large proportion of the data shared on Facebook is still text. Facebook uses a tool it developed itself called DeepText to extract meaning from words we post by learning to analyze them contextually. Neural networks analyze the relationship between words to understand how their meaning changes depending on other words around them. It learns for itself based on how words are used. It can easily switch between working across different human languages and apply what it has learned from one to another.It can easily switch between working across different human languages and apply what it has learned from one to another.

5. How Facebook Uses Data Analytics To Understand Your Posts And Recognize Your Face?

Facial recognition - Facebook uses a DL application called DeepFace to teach it to recognize people in photos. It says that its most advanced image recognition tool is more successful than humans in recognizing whether two different images are of the same person or not – with DeepFace scoring a 97% success rate compared to humans with 96%.

6. What is public health analytics?

Public health analytics is the process of obtaining, reviewing, and managing health-related data of entire populations, typically carried out by public health organizations in an effort to maintain population health. Public health data may include mortality reports, demographic data, socioeconomic data, procedural and diagnostic data, and medical claims data, among others. Public health organizations may use analytics to monitor disease trends and

determine patterns in certain populations, guide the implementation of disease control programs, and set priorities for allocating health resources to populations in need.

7. Which are the 10 companies that are using big data?

a. Amazon
b. Apple
c. Spotify
d. Google
e. Facebook
f. Instagram
g. Netflix
h. Starbucks
i. American Express
j. McDonald's

8. How You Can Leverage the Power of Data to Grow Sales?

There is only one place to begin, and this is with data analytics that pertains to your audience. This will give you in-depth insights regarding the demographics of your audience, i.e. their gender, age, income, occupation, where they are based and what language they speak. In addition to this, audience data should inform you of the different devices that your audience is using. Do they mainly access your store from their mobile phone or desktop? If it is the former, do they tend to use Android or Apple devices? This can give you great insights into how your online store is being accessed so that you can target your efforts accordingly.

9. Where does big data come from?

Big data is often boiled down to a few varieties including social data, machine data, and transactional data. Social media data is providing remarkable insights to companies on consumer behavior and sentiment that can be integrated with CRM data for analysis, with 230 million tweets posted on Twitter per day, 2.7 billion Likes and comments added to Facebook every day, and 60 hours of video uploaded to YouTube every minute. Machine data consists of information generated from industrial equipment, real-time data from sensors that track parts and monitor machinery (often also called the Internet of Things).

10. Who are some of the BIG DATA users?

From cloud companies like Amazon to healthcare companies to financial firms, it seems as if everyone is developing a strategy to use big data. For example, every mobile phone user has a monthly bill which catalogs every call and every text; processing the sheer volume of that data can be challenging. The size of Big Data can be relative to the size of the enterprise. For some, it may be hundreds of gigabytes, for others, tens or hundreds of terabytes to cause consideration.

11. How Data Science differs from Big Data and Data Analytics?

Data Science is a field which contains various tools and algorithms for gaining useful insights from raw data. It involves various methods for data modelling and other data related tasks such as data cleansing, preprocessing, analysis, etc. Big Data implies the enormous amount of data which can be structured, unstructured and semi-structured generated through various channels and organisations. The tasks of Data Analytics involve providing

operational insights into complex business situations. This also predicts the upcoming opportunities which the organisation can exploit.

12. How does big data help in decision making for the organization?

Research backs these claims, with studies showing businesses that use big data for making decisions realize up to a 10% increase in profits and a 10% decrease in overall costs. Data can be used to make financial, growth-related, marketing and sales, and customer service decisions that drive your business forward.

13. What is "big data for small business"?

Many small businesses believe they are too small for big data. This is far from the truth as small businesses need big data to succeed, just as much as larger corporations. Data provides businesses with actionable insights needed to become more efficient and profitable.

14. What are Big Data Tools and Software?

a. Hadoop.
b. Quoble.
c. Cassandra. ...
d. MongoDB. ...
e. Apache Storm. ...
f. CouchDB. ...
g. Statwing

15. How Big Data is changing the Way People Live Their Lives?

The changes in how big data is collected have occurred so rapidly that big data is more prevalent in daily life than you might think. Companies and organizations are collecting information about their targeted audiences. They know what you're watching, what you're reading, and what you're buying.This access to key, personalized data then affects your daily experience in some of the most important and common areas of life. Consider these ways big data is used in your everyday life:

a. Music, Shows, and Movies
b. Healthcare and medical services
c. Shopping and Marketing
d. Travel and Transportation
e. News and Information
f. Education and Employment

Reference:

1. Digital 101 Course offered by Future Skill Prime Platform
2. Why do we need a Database (tutorialspoint.com)
3. Relational Versus Nonrelational Databases | Storing Data in AWS | Pearson IT Certification
4. Overview of PivotTables and PivotCharts (microsoft.com)
5. Introduction to Pivot Tables, Charts, and Dashboards in Excel (Part 1) - YouTube

6. MS Excel - Pivot Table Example 1 Video Tutorials - YouTube
7. MS Excel - Pivot Chart - YouTube

An Overview of Artificial Intelligence:

Trainer input- AI is touching us in all aspects of our daily lives, most of the times unknowingly. Whenever we shop online, use our mobiles, drive to work daily, check our mail box or exercise, AI is coming into play and helping us, prodding us or controlling us. Since AI is already such an integral part of our lives, it makes sense to get more knowledge of this emerging technology.

From chess-playing computers to self-driving vehicles, Artificial Intelligence (AI) is progressing rapidly and touching every aspect of our lives. In this module, you will learn how machines can be made to learn from data and carry out human tasks.

Artificial Intelligence Explained

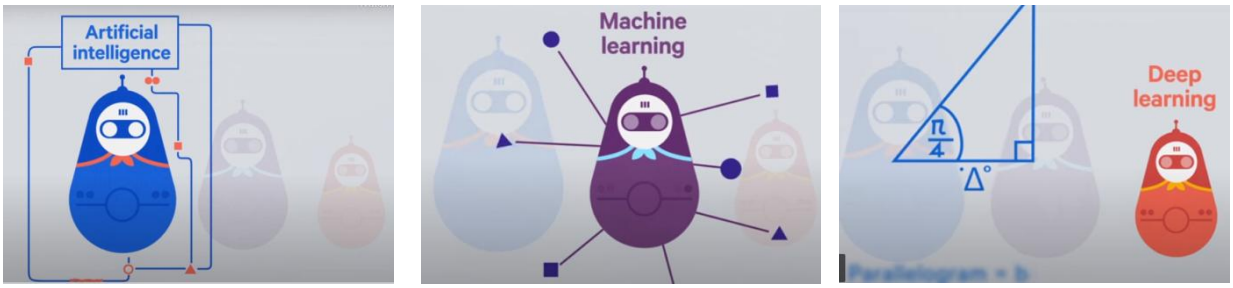
What is AI?

AI is techniques that help machines and computers mimic human behaviour.

Or in simple words,

AI is intelligence demonstrated by machines, as opposed to the **natural intelligence** displayed by humans or animals.

Ai is like a Russian Doll – a series of dolls one inside the other – AI>ML>DL



At the highest level, AI is a device being smart, a machine acting like a human. It is **the simulation of human intelligence processes by machines**, especially computer systems.

Next level is the How of AI. It is possible because of Machine Learning (ML). ML is the general techniques or variety of techniques that make the device smart. It is a branch of artificial intelligence based on the idea that systems can learn from data, identify patterns and make decisions with minimal human intervention.

The innermost level is Deep Learning (DL). Deep learning is **a subset of machine learning**, which is essentially a neural network with three or more layers. These neural networks attempt to simulate the behaviour of the human brain, allowing it to "learn" from large amounts of data.

Examples of AI?

1. Typing using software : While typing reports using any word-processor, wrong spellings or incorrect grammar is highlighted. We also are exposed to auto-complete options of previously used words, or auto-suggest of commonly used words while typing an e-mail, a SMS message or a social-media post.

These are all examples of AI in action. The underlying software is intelligently monitoring what is being typed. The word (complete or incomplete) is matched with an inbuilt database, and either suggestions or corrections are displayed for the user to choose from or ignore.

2. Shopping online : All of us are now used to shopping online. We are either ordering clothes or gadgets online, or using a streaming service (watching movies/shows online). Depending on the user profile, the

system shows ads, products or suggests programs to watch. So, what a 65 year old male is shown is different from what a 16 year old girl will be shown, even though they may be using the same service/portal.

Here too, AI is in play. The software is constantly monitoring what we are watching or searching online. Previous history of browsing is also looked at. Shopping preferences are noted. Then, appropriate suggestions are displayed. All this is happening invisibly or unknown to us.

3. Chatbots : Chatbots are used universally today on many websites to interact with the human users that arrive on the specific sites. They try to provide them effective communication and explain to the users how the company or industry works while providing detailed instructions and guides with spontaneous replies.

Chatbots are usually used for quick responses to most commonly asked questions on a particular website. They save time as well as reduce human labour and expenditure.

Exercises to assess understanding of the concepts

1. You go to a shopping mall and purchase some provisions. You are a regular customer of the mall. Do you think AI is being used in this situation to make your shopping better?

2. You order food through an online delivery app frequently. Is AI influencing your ordering decisions?

Assignments to test assimilation of knowledge

1. Write three situations in your daily life, where AI is coming to your aid.

2. Can you think of how AI can be used to make life easier for senior citizens? Mention a few instances.

Practical Assignments using common tools

1. Using any popular search-engine (Google, Bing), type any word in the search-box, and note down the automatic suggestions that are being displayed. Note down how many of these are topically relevant or related to current happenings.

2. Use any word-processor to type a small report on any topic or type a small SMS on your smartphone. Deliberately make spelling mistakes, or grammatical mistakes. Note down the suggestions that are being offered by the in-built spell-check utility.

3. Identify a few websites/portals which use chatbots to enhance user experience.

Note: The trainer is instructed to encourage the students to work in groups of 02-03 and discuss the above exercises before submitting the same

FAQs

1. What is Artificial Intelligence?
    - Artificial Intelligence is when a software or a particular model developed can perform complex tasks on its own without requiring any assistance from humans. Artificial Intelligence is a field of study consisting of various sub-fields, including machine learning, deep learning, neural networks, computer vision, natural language processing, and so much more.
2. How powerful is AI?
    - The power of AI depends on the capability of the researcher working on the computation of the program. As of now, AI is quite powerful to solve a set of tasks that is assigned to it efficiently and effectively. However, it hasn't reached its peak yet, and we are a few years away from that point.
3. Will AI steal our jobs?
    - The demand for skilled AI specialists is growing faster like never before. Requirements and open positions for experts in the sub-fields of AI like machine learning, deep learning, computer vision, statistics, and natural language processing are growing each day. So, AI will pave the way for more jobs for humans to control them. Humans are intellectual beings. Hence, AI will simplify the complexity of human work but won't actually take away our jobs.

4. Can AI take over the world?
    - Artificial Intelligence has come a long way and developed into a unique feature of the modern world. Despite the advancements in AI, most of the tasks are still done under some kind of human supervision in the working or the development stages.
    - Artificial Intelligence is also limited to be the particular task that it is programmed to complete. So, as of today, AI taking over the world is unlikely.
5. What are the advantages of AI?
    - Apart from the massive job opportunities created by AI, it also has other advantages, such as the completion of looping or repetitive tasks that humans need to perform without making errors.
    - Artificial Intelligence, similar to a computer program, cannot tire and hence has the capacity to work all day long on a particular task until the desired results are accomplished.
    - They have the ability to perform faster computations compared to human speed on a wide range of problems with precise results. They also have tons of real-life applications to make our daily lives simpler.
6. What are the disadvantages of AI?
    - The construction of Artificial Intelligence models from scratch can sometimes be time-consuming and resourcefully exhaustive. Building such models may not be possible on a regular PC.
    - The deployment of Artificial Intelligence models can also be quite expensive in some cases. Also, the maintenance costs in case of malfunctioning of the AI models in peculiar cases can be annoying to deal with and solve.
    - AI cannot be used to accomplish more superior and intellectual tasks, as of today.
7. What are the applications of AI?
    - Artificial Intelligence in the natural world has a wide variety of applications. These include your journey from the start of the day till the end of the day. When you usually start your day with your smartphone, you make use of the AI capabilities of smart face lock or other fingerprint AI measures to unlock your phone.
    - Then you decide to google something, you are greeted with AI features of autocomplete and autocorrect, which utilizes technologies of sequence to sequence modeling. Apart from smartphones, Artificial Intelligence has tons of other applications, including email spam detection, virtual assistants, chatbots, optical character recognition, and so much more.
    - Artificial Intelligence also finds its applications in many other fields, such as topics ranging from robotics, medical sciences, logistics and transportation, finances, and tons more utility services in industries.
8. Do you need to be a genius to start learning AI?
    - No, not necessarily. Artificial Intelligence is a field containing a lot of sub-fields. It is worth investing your precious time to gain further knowledge in the subject of AI if you are particularly interested in the various intriguing concepts that are offered by learning AI.
    - While learning AI from scratch might sometimes be hard at the beginning, it becomes more interesting and cool as you proceed to invest more time learning numerous concepts related to AI. You will gain exposure to mathematics, programming, machine learning, and so much more that will expand your vast knowledge.
    - Even if you find that the field of Artificial Intelligence is not suitable for your particular interests, it is still totally fine as long as you learn something about the numerous topics of AI.
    - The knowledge you gain from learning AI can be partially or completely utilized for various software applications and jobs as well.

Note: Trainer should encourage discussion on these FAQs and motivate students to come up with different answers

References:

1. Future Skills Prime content developed by MEITY-NASSCOM
2. Wikipedia
3. https://www.towardsdatascience.com

Course Content

Semester:

Course Title: **Digital Fluency**	Course Credits: 2
Total Contact Hours: 15 hours of theory and 30 hours of practicals	Duration of ESA:
Formative Assessment Marks: 5**0 marks**	Summative Assessment Marks: 50 marks
Model Syllabus Authors:	

Course Outcomes (COs):

At the end of the course the student should be able to:

(Write 3-7 course outcomes. Course outcomes are statements of observable student actions that serve as evidence of knowledge, skills and values acquired in this course)

1. Have an intelligent conversation on the key concepts and applications of Artificial Intelligence (AI), Big Data Analytics (BDA), Internet of Things (IoT), Cloud Computing, and Cybersecurity

2. Develop holistically by learning essential skills such as effective communication, problem-solving, design thinking, and teamwork

3. Build his/her personal brand as an agile and expansive learner – one who is interested in horizontal and vertical growth?

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs)

This mapping needs to be done considering POs of respective programs.

Course Outcomes (COs) / Program Outcomes (POs)	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
1. Have an intelligent conversation on the key concepts and applications of AI, BDA, IoT, Cloud Computing, and Cybersecurity												
2. Develop holistically by learning essential skills such as effective communication, problem-solving, design thinking, and teamwork												

3. Build his/her personal brand as an agile and expansive learner – one who is interested in horizontal and vertical growth												

Course Articulation Matrix relates course outcomes of course with the corresponding program outcomes whose attainment is attempted in this course. Mark ‘X’ in the intersection cell if a course outcome addresses a particular program outcome.

Course Content (Digital 101)

	Details of topic	**Duration**
Module 1: Emerging Technologies	Overview of Emerging Technologies: i. Artificial Intelligence, Machine Learning, Deep Learning, ii. Database Management for Data Science, Big Data Analytics, iii. Internet of Things (IoT) and Industrial Internet of Things (IIoT) iv. Cloud computing and its service models v. Cyber Security and Types of cyber attack	05 hours
Module 2: Applications of Emerging Technologies	Applications of emerging technologies: i. Artificial Intelligence ii. Big Data Analytics iii. Internet of Things iv. Cloud Computing v. Cyber Security	05 hours
Module 3: Building Essential Skills Beyond Technology	Importance of the following: **i.** Effective Communication Skills ii. Creative Problem Solving & Critical Thinking iii. Collaboration and Teamwork Skills iv. Innovation & Design Thinking v. Use of tools in enhancing skills	05 hours

References to learning resources:

1. The learning resources made available for the course titled “Digital 101” on Future Skills Prime Platform of NASSCOM

Pedagogy

Flipped classroom pedagogy is recommended for the delivery of this course.

For every class:

1. Before coming to the class students are expected to go through the content (both video and other resources) on the related topic and give the quiz on Future Skills Prime Platform of NASSCOM.

2.Class room activities are designed around the topic of the session towards developing better understanding, clearing mis-conceptions and discussions of higher order thinking skills like application, analysis, evaluation and design.

3.Every theory class ends with announcement of exercise for practical activity of the week

Assessment

Formative Assessment	
Assessment Occasion	**Weightage in Marks**
1. After watching videos of each topic, 05 marks tests are to be given by the students on Future Skills Prime Platform. The total marks earned by students is to be computed.	No weightage
2. Practical Sessions: A total of 05 activities from Module 1 and Module 2 and 03 activities from Module 03 need be completed by students. All the activities are expected to be done in teams of 02 -03 students per team. Each session performance is assessed for 10 marks against announced rubrics for assessment. The total marks earned by students is to be computed.	50%
3. Summative Assessment : After completion of all 3 modules students will be giving Final Assessment with 30 questions (30 min) on Future Skills Prime platform. Students will have two attempts and those who score at least 50% marks will get certificate from NASSCOM-AICTE.	This assessment may be given 50% weight in computing the final grade of the students.

Date: **Co-Ordinator**