GOVERNMENT POLYTECHNIC COLLEGE,NANDED.
INFORMATION TECHNOLOGY ,DEPARTMENT

VISION

MISSION

Program Outcomes (POs)

- **Basic and Discipline specific knowledge :** Apply knowledge of basic mathematics, science and engineering fundamentals and engineering specialization to solve the engineering problems
- **Problem analysis :** Identify and analyse well-defined engineering problems using codified standard methods
- **Design/ development of solutions :** Design solutions for well-defined technical problems and assist with the design of systems components or processes to meet specified needs
- **Engineering Tools, Experimentation and Testing :** Apply modern engineering tools and appropriate technique to conduct standard tests and measurements
- **Engineering practices for society, sustainability and environment :** Apply appropriate technology in context of society, sustainability, environment and ethical practices
- **Project Management :** Use engineering management principles individually, as a team member or a leader to manage projects and effectively communicate about well-defined engineering activities
- **Life-long learning :** Ability to analyse individual needs and engage in updating in the context of technological changes

Program Educational Objectives (PEOs)

- Become competent Information Technology engineer to work as a programmer or an administrator in a team or as an individual
- Pursue higher studies in relevant field of engineering with a desire for lifelong learning
- Become a successful professional with ethical and societal responsibilities

Program Specific Outcomes (PSOs)

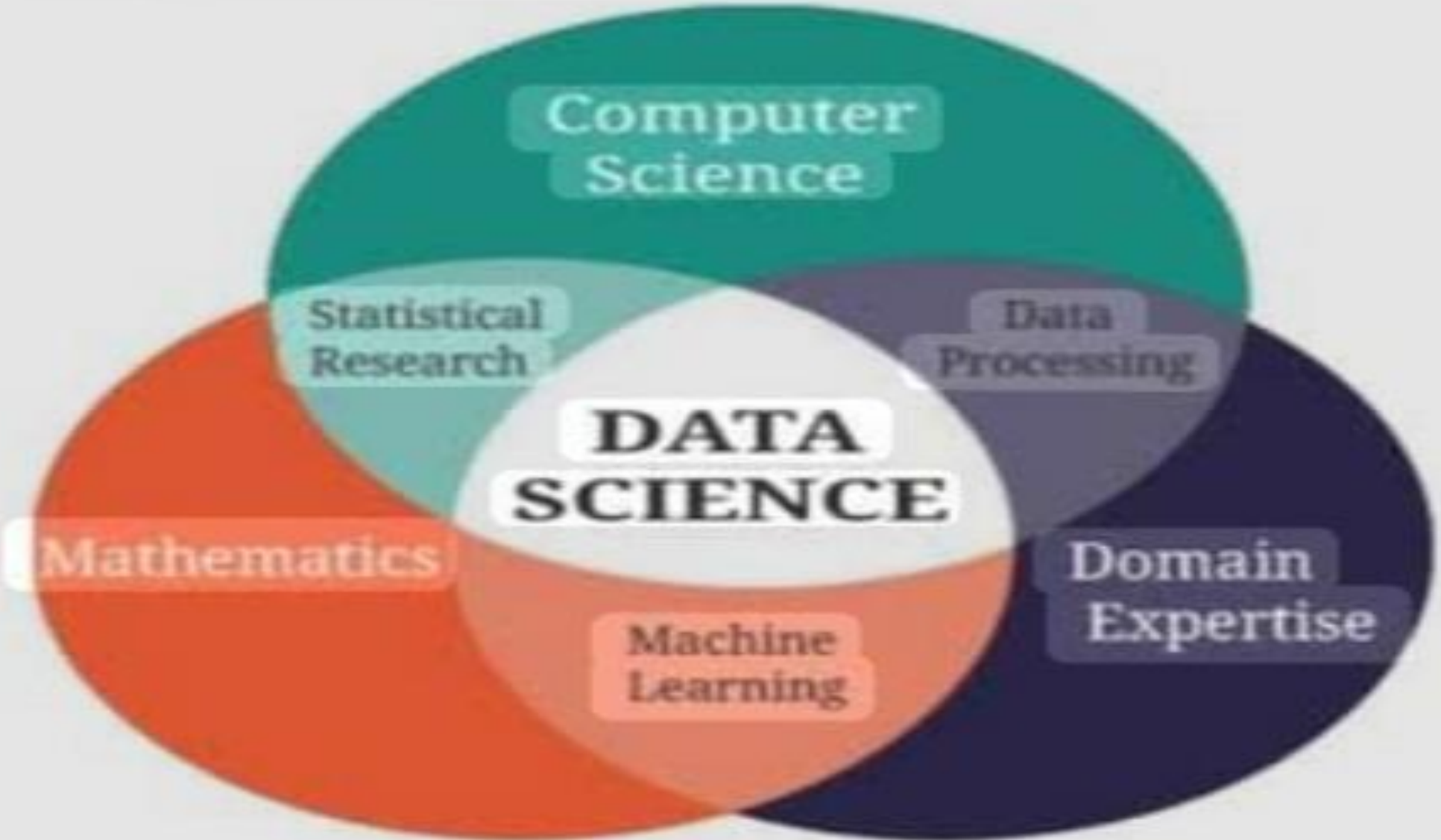
- **Modern Information Technology:** Use latest technologies for operation and application of information.
- **Information Technology Process:** Maintain the information processes using modern information and communication technologies


DATA
SCIENCE

What is Data Science?

similar to data mining

Data science is a "concept to unify statistics, data analysis, machine learning and their related methods in order to "understand and analyse actual phenomena" With data



Data Science: Bridging Innovation and Impact

Welcome to a journey into the world of data science, explored through the lens of a leading innovator. This presentation will cover the evolution of data science, its core principles, and its tangible impact on our lives, particularly through platforms like Nvidia Maxine. We'll also delve into the human stories behind the data, highlighting how passion and purpose drive scientific advancement for social good.

Components of Data Science

- Data & Data Collections 
- Machine Learning 
- Data Engineering 
- Programming languages 
- Statistics 
- Big Data 

Data Science Applications

01 E-Commerce

02 Healthcare

03 Gaming

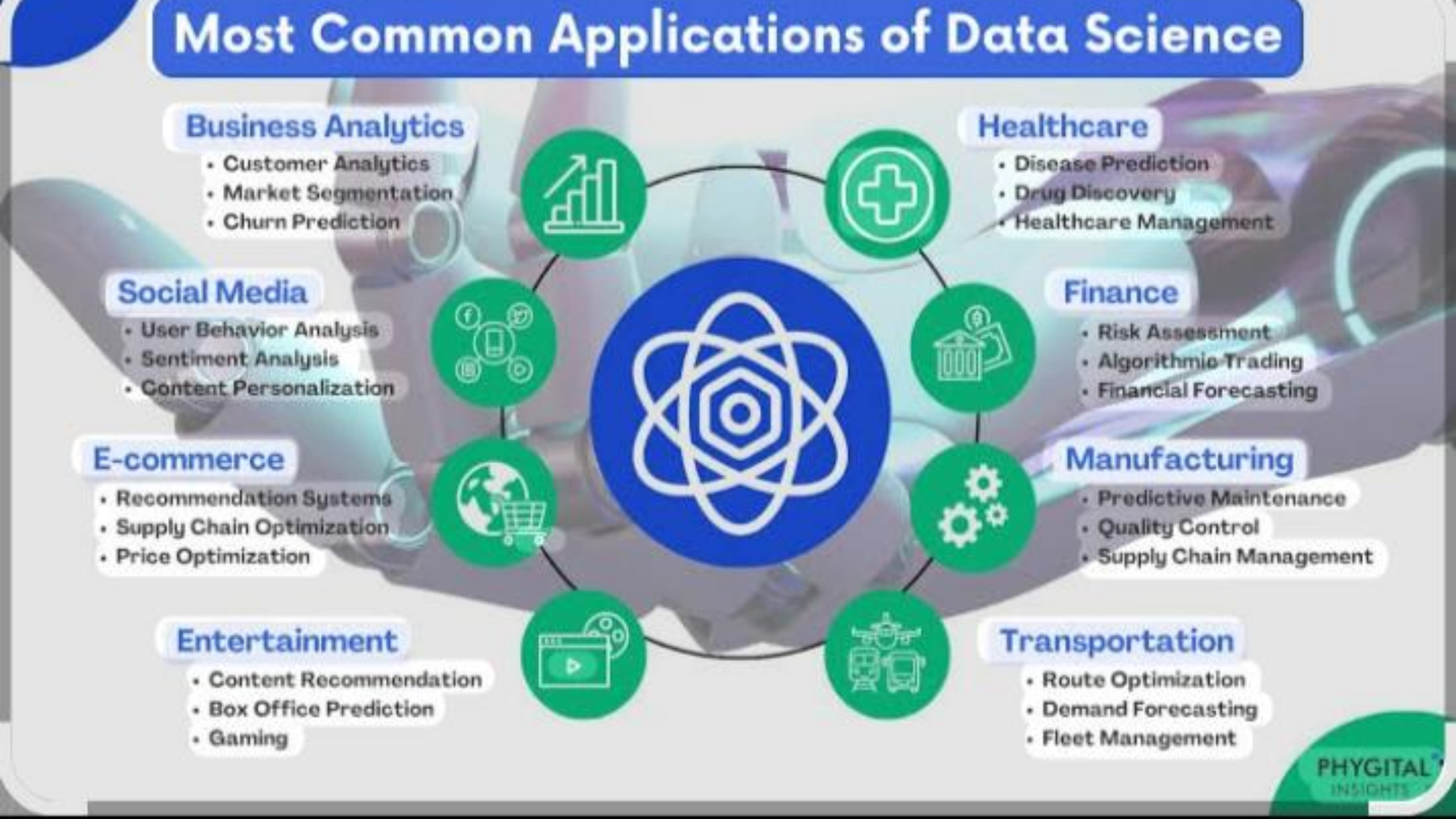
04 Energy

05 Travel

06 Finance

TechVidvan

Most Common Applications of Data Science



Business Analytics
- Customer Analytics
- Market Segmentation
- Churn Prediction

Healthcare
- Disease Prediction
- Drug Discovery
- Healthcare Management

Social Media
- User Behavior Analysis
- Sentiment Analysis
- Content Personalization

Finance
- Risk Assessment
- Algorithmic Trading
- Financial Forecasting

E-commerce
- Recommendation Systems
- Supply Chain Optimization
- Price Optimization

Manufacturing
- Predictive Maintenance
- Quality Control
- Supply Chain Management

Entertainment
- Content Recommendation
- Box Office Prediction
- Gaming

Transportation
- Route Optimization
- Demand Forecasting
- Fleet Management

PHYGITAL INSIGHTS

Tools & Technologies Powering Data Science

Programming & Libraries

- **Python:** Widely used for its extensive libraries like NumPy, Pandas, Scikit-learn.
- **R:** Strong for statistical computing and graphics.
- **SQL:** Essential for database querying and management.
- **TensorFlow/PyTorch:** Leading frameworks for deep learning.

Platforms & Environments

- **Jupyter Notebooks:** Interactive computing for development and presentation.
- **Apache Spark:** For large-scale data processing and analytics.
- **Tableau/Power BI:** Business intelligence tools for visualization.
- **Cloud Platforms:** AWS, Google Cloud, Azure for scalable infrastructure.

Machine Learning: The Heart of Data Science

> "Machine learning is the science of getting computers to act without being explicitly programmed."
>
> — Arthur Samuel

Machine Learning (ML) enables systems to automatically learn and improve from experience without explicit programming. It's a core component of data science, driving intelligent applications.

- **Applications:** Powers recommendation systems (Netflix, Amazon), fraud detection, medical diagnoses, and autonomous vehicles.
- **Methods:** Includes supervised, unsupervised, and reinforcement learning techniques.

Challenges in Data Science

Data Quality & Bias

Ensuring data accuracy, completeness, and mitigating inherent biases in datasets.

Ethical Concerns

Addressing privacy, transparency, and fairness in algorithmic decision-making.

Evolving Technologies

Keeping pace with rapid advancements in tools, techniques, and methodologies.

Navigating these challenges is crucial for responsible and effective data science deployment.

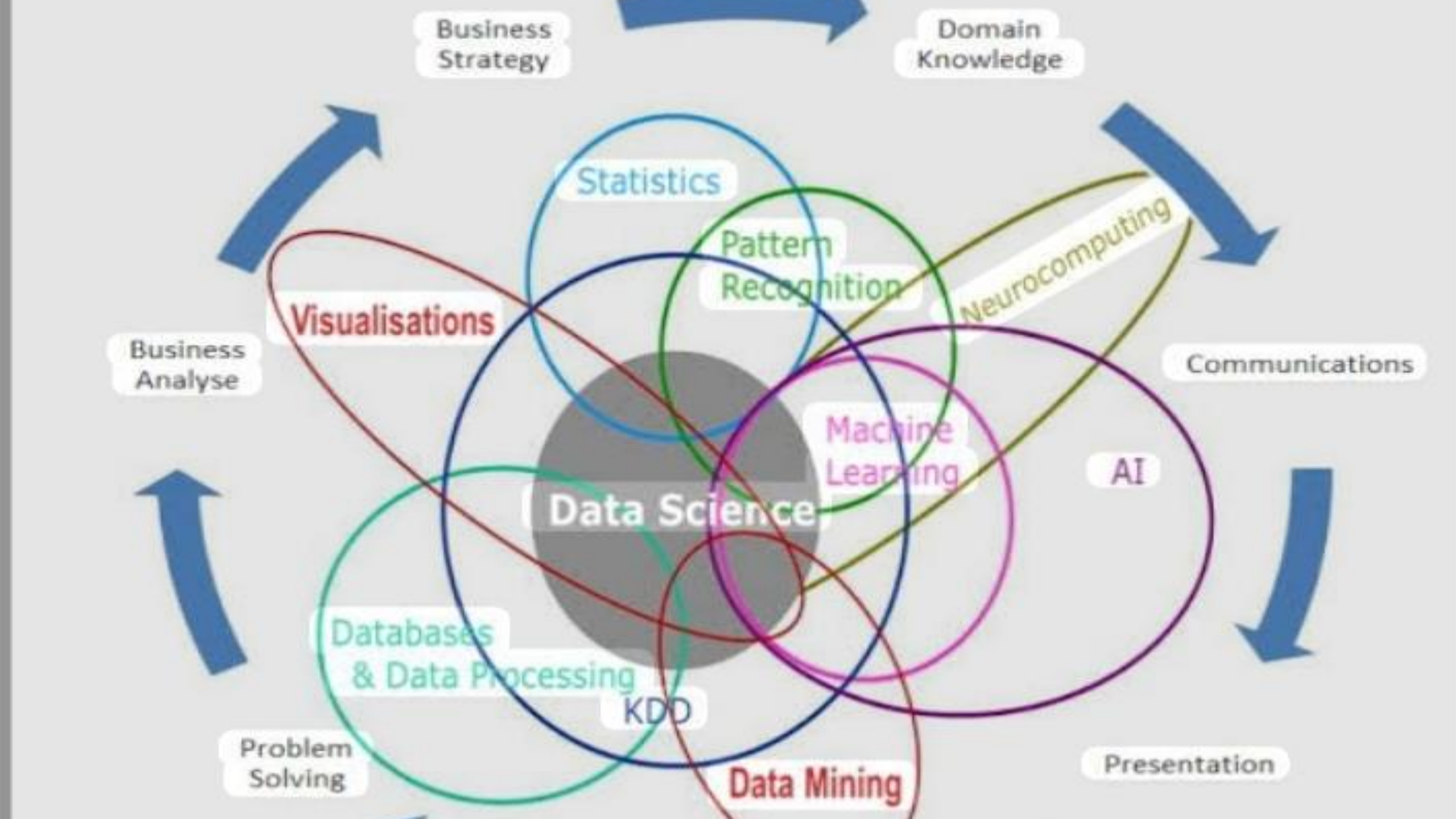
Advantage and Disadvantage of Data Science

Advantage

- It's in demand
- Abundance of Positions
- Highly Paid Career
- Highly Prestigious
- Versatile
- Better Desision Making
- Predictive Analytics

Disadvantage

- It's a Blurry Term
- Masterign Data Science isnearly impossible
- Large amount of domain knowledge required
- Arbitrary Data May Yield Unexpected Results
- Problems of Data Privacy
- Cost and Time
- Bias in Data


Business Strategy
Domain Knowledge
Statistics
Pattern Recognition
Neurocomputing
Visualisations
Business Analyse
Communications
Machine Learning
AI
Data Science
Databases & Data Processing
KDD
Problem Solving
Data Mining
Presentation

Key Skills of a Data Scientist

Technical Proficiency

- **Programming:** Python, R, SQL for data manipulation and analysis.
- **Statistics & Math:** Probability, linear algebra, calculus for understanding data patterns.
- **Machine Learning & AI:** Building predictive models and neural networks.

Soft Skills

- **Communication:** Translating complex data insights into understandable stories for diverse audiences.
- **Problem-Solving:** Identifying the right questions and designing effective analytical approaches.
- **Domain Expertise:** Understanding the business context to apply data science effectively.

Data Science with Data Analytics

This slide represents the difference between data science and data analytics based on skillset, scope, exploration and goals and how both will work together.

With the combination of Data Science and Data Analytics, data scientists will be gain better problem-solving skills to carry out valuable data analytics that will 100% more accurate and will help in decision making

	Data Science	Data Analytics
Skillset	› Data Modelling › Predictive Analytics › Advanced Statistics › Engineering/ Programming	› BI Tools › Intermediate Statistics › Solid Programming Skills › Regular Expression (SQL)
Scope	› Macro	› Micro
Exploration	› Search Engine Exploration › Machine Learning › Artificial Intelligence › Big data- Often Unstructured	› Data Visualization › Techniques › Designing Principles › Big-Data- Mostly Structured
Goals	› Discover New › Questions to Drive › innovation	› Use Existing › Information to Uncover › Actionable Data

4 Stages of Data Processing Cycle Diagram Example

Usage example fully editable

Data output

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Data collection

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Data processing

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Data input

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AI Works: Behind the Scenes

Neural Network Upscaling

Trained neural networks intelligently fill missing pixels in low-resolution video, creating sharper, more detailed images in real time.

AI Video Compression

Advanced AI algorithms compress video streams so efficiently that bandwidth usage is reduced to one-tenth of traditional standards, ensuring smooth communication even with limited connectivity.

Real-Time Tracking & Effects

Utilizes real-time face and body tracking for sophisticated augmented reality effects, allowing for dynamic virtual backgrounds and expressive interactions without specialized hardware.

This intricate process demonstrates the practical power of AI and data science in optimizing communication technologies.

ANALYTIXLABS

Data Science VS Artificial Intelligence : Key Highlights

	Data Science	Artificial Intelligence
1	Requires pre-processing, analysis, visualization, and build predictive models	Use pretrained models for classification, predictions and pattern recognition
2	Primarily uses statistical techniques and ML Models	Implements ML and Deep Learning algorithms
3	Finds hidden patterns in data	Gives autonomy to data models
		Used for building models that

Exploratory Data Analysis (EDA) in Model Planning Phase

This slide depicts the exploratory data analysis in the model planning phase of data science and its various stages and reasons behind using it.

Gather information & gain the domain knowledge

Measures of central tendency Mean Median mode

Skewness right & left Kurtosis Thinner peak Wider peak

Confirm data types and their probabilities

Measures of dispersion Variance Std. Dev Range

Graphical Representation Boxplot Barpot Dotpot histogram

- To guarantee teams are prepared to utilize machine learning algorithms in a project
- To pick the most appropriate algorithms for informational collection
- To describe the component factors that can possibly be utilized for machine learning
- Add Text Here
- Add Text Here

BENEFITS OF DATA SCIENCE

Benefits of Data Science for Business

Conclusion: Data Science as a Superpower for the Future

> **The future belongs to those who can learn from data and turn insights into impact.**

From its academic roots to revolutionary AI-driven platforms like Nvidia Maxine, data science is undeniably reshaping our world. Empowered by dedicated researchers and innovators like Maxine, it holds the key to solving some of humanity's most complex challenges, particularly in health and communication. Embrace the power of data science, and join the journey toward a more informed and impactful future.

GOVERMENT POLYTECHIC NANDED

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- TOPIC NAME : DATA SCIENCE

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