Module-5 Career Opportunities and Data Analysis in Action

In this module, you will learn about the different career opportunities in the field of Data Analysis and the different paths that you can take for getting skilled as a Data Analyst. At the end of the module, you will demonstrate your understanding of some of the basic tasks involved in gathering, wrangling, mining, analyzing, and visualizing data.

Learning Objectives

- List the different career opportunities in Data Analysis and the learning paths you can consider for getting skilled as a Data Analyst.
- Demonstrate your proficiency in some of the basic data gathering, wrangling, mining, analysis, and visualization tasks.
- Analyze a Case Study and Data Set for a Credit Card Fraud and identify key factors that impact the process of Data Analytics.

Before you start

Practically Speaking: Making the Leap from Learner to Analyst

♠ Introduction to Module 5: Career Opportunities and Data Analysis in Action

Milestone Achievement

- Entering Module 5 is a significant achievement.
- Demonstrates dedication and consistent effort.

• Module Focus

- Shift from theory to real-world application.
- Exploration of career opportunities in data analysis.
- Emphasis on making a real-world impact with learned skills.

Real-World Application: Credit Card Fraud Detection

Overview

- Fraud detection is a major application of data analysis.
- Involves detecting unusual patterns in spending behavior.

Importance

Credit card fraud costs the global economy billions annually.

• Data analysts play a crucial role as the "front line of defense."

Nature of the Work

- Constantly evolving due to smarter criminals.
- o Dynamic and high-stakes environment.

Career Transitions into Data Analysis

• Diverse Backgrounds

- Many successful data analysts come from non-technical fields.
- Valuable transferable skills from other professions:
 - **Research**: Asking insightful data questions.
 - **Teaching/Communication**: Explaining complex data clearly to non-experts.

• Key Point

• Non-technical skills are not a barrier — they can be a strong advantage.

📕 Navigating Career Paths in Data

• Without Understanding the Landscape

- Like navigating without a map.
- Risk of feeling overwhelmed or lost.
- Lack of awareness of roles, industry needs, or portfolio importance.

• With Clear Understanding

- Understands specialist roles and industry contexts.
- Recognizes the value of a professional portfolio.
- Can make informed, strategic decisions about learning and job hunting.

K Practical Career Tips

Tip 1: Identify Areas of Interest

• Explore which **industries** or **problems** excite you.

- o Examples: Finance, healthcare, retail, tech, government.
- Connect interests to domain-specific data analysis opportunities.

Tip 2: Build a Professional Portfolio

- Start collecting and curating project work now.
- A portfolio:
 - o Provides proof of your skills.
 - Acts as a dynamic and visual resume.
 - o Demonstrates real-world application of knowledge.

Tip 3: Stay Updated with Emerging Tech

- Keep learning about innovations like **Generative AI** in analytics.
- Applications include:
 - Task automation.
 - o Synthetic data generation.
- The field is fast-evolving staying curious is essential.

S Actionable Next Step

- Reflect on previous exercises like identifying data for decisions.
- Now, take it further:
 - **Dive into resources or communities** related to your area of interest.
 - Example: If interested in **finance**:
 - Explore finance job boards.
 - Join LinkedIn groups related to finance analytics.
 - Observe current challenges and discussions.

Reflective Prompt

• What kind of impact do you hope to make with your data analysis skills?

• Helps uncover your deeper motivation — the "why" behind your journey.

Summary

Module 5 of "Practically Speaking" marks a transition from learning data concepts to applying them in real-world careers. The episode emphasizes how data analysis plays a vital role in areas like fraud detection and highlights how individuals from non-technical backgrounds can successfully enter the field. Key strategies for career success include identifying personal interests, building a portfolio, and staying informed about emerging tech like generative AI. The importance of understanding career paths, roles, and industry needs is stressed, along with actionable steps to explore specific domains and professional communities.

Key Takeaways:

- Fraud detection is a crucial, high-impact area for data analysts.
- Non-technical backgrounds can provide valuable transferable skills.
- Understanding career paths helps make informed learning and job decisions.
- Build a professional portfolio to showcase your skills.
- Stay current with evolving technologies like generative AI.
- Reflect on the impact you want to make with your skills.

Topic/Section	What We Learnt				
Module Introduction	Module 5 focuses on real-world applications and career opportunities in data.				
Credit Card Fraud Detection	A prime example of how data analysis combats global-scale fraud.				
Career Transitions	Success in data analysis can come from diverse professional backgrounds.				
Navigating Career Paths	Understanding industry roles and building a portfolio gives clear direction.				
Tip: Identify Interests	Explore specific industries or problems that excite you for targeted growth.				
Tip: Build a Portfolio	A visual, dynamic resume to demonstrate your data skills to employers.				
Tip: Track Emerging Tech	Keep learning, especially about tools like generative AI reshaping analytics.				
Actionable Step	Join online communities, explore job boards, and connect with your industry.				

Opportunities and Learning Paths

Career Opportunities in Data Analysis

Q Job Opportunities for Data Analysts

- Data analyst job openings are present across:
 - Industry
 - Government
 - o Academia
- Industries hiring data analysts include:
 - Banking and Finance
 - Insurance
 - Healthcare
 - o Retail
 - Information Technology (IT)
- Data analyst roles are in demand both in:
 - Large corporations
 - Startups and new ventures

Market Growth & Demand

- According to **Forbes**:
 - o **Big Data Analytics Market** in 2018: \$37.34 billion
 - o Projected CAGR (2019–2027): **12.3%**
 - Expected market size by 2027: \$105.08 billion
- High demand vs. low supply:
 - Companies are **willing to pay a premium** for skilled data analysts



- Data Analyst roles classified into:
 - 1. Data Analyst Specialist Roles
 - 2. Domain Specialist Roles
 - 3. Analytics-Enabled Roles

1. Data Analyst Specialist Roles

- For professionals focusing on technical and functional growth
- Typical career progression:
 - o Associate / Junior Data Analyst
 - Data Analyst
 - Senior Analyst
 - Lead Analyst
 - o Principal Analyst

• Experience Path:

- Varies by **industry**, **organization size**, and **team structure**
- Smaller teams: Broader experience across all data analysis phases
- o **Larger teams**: Specialized roles focusing on a specific part of the data pipeline

Skill Development:

- **Technical, statistical, and analytical skills** grow from foundational to expert level
- Tools exposure:
 - Start: One querying tool, one programming language, limited data repositories
 - o Later: Multiple tools, languages, repositories, advanced technologies
- Other required skills:
 - Communication and presentation
 - Stakeholder and project management
- Advanced roles may include:
 - Establishing team processes
 - Recommending tools/software

• Team upskilling and expansion

2. Domain Specialist Roles (Functional Analysts)

- Focused on **domain expertise** over deep technical skills
- Domains include:
 - o Healthcare, Sales, Finance, Social Media, Digital Marketing
- Common job titles:
 - Healthcare Analyst
 - Sales Analyst
 - Marketing Analyst
 - Social Media Analyst

3. Analytics-Enabled Roles

- Traditional roles enhanced by analytics skills
- Examples:
 - Project Managers
 - Marketing Managers
 - HR Managers
- Analytics improves **efficiency** and **effectiveness**
- **Significant portion** of data analyst job openings fall into this category

Career Expansion Opportunities

- Options to transition into related data fields:
 - Data Engineering
 - Ideal if interested in data lakes and big data repositories
 - Data Science
 - Business Analytics / Business Intelligence

Ideal if drawn to business-side functions

Learning & Growth Resources

- Vast resources available to support career growth
- Success depends on:
 - Proactiveness
 - Continuous learning
 - Seizing opportunities

Summary

This content provides a comprehensive overview of the **data analyst career landscape**, highlighting job opportunities, market demand, career paths, and skill growth. With a projected global market boom, data analysts are highly sought after in various sectors. Career paths can be specialized technically, domain-focused, or analytics-enabled. Professionals can also explore adjacent data fields like data engineering or business analytics. Ultimately, the key to success lies in proactive learning and embracing the vast career development resources available.

🔑 Key Takeaways:

- II Huge market growth and high demand for skilled analysts
- 💼 Career paths: technical, domain-based, and analytics-enabled
- Continuous skill development in tools, technologies, and soft skills is crucial

Topic/Section	What We Learnt						
Job Opportunities	Available across industries, government, academia, startups, and large companies						
Market Size & Growth	Projected to grow from \$37.34B (2018) to \$105.08B (2027) at 12.3% CAGR						
Career Pathways	Includes specialist roles, domain-focused roles, and analytics-enabled roles						
Specialist Roles	Technical advancement from junior to principal levels						
Domain Specialist Roles	Analysts with expertise in areas like finance, marketing, and healthcare						

Analytics-Enabled Roles	Traditional roles enhanced by analytics (e.g., HR Manager, Marketing Manager)
Skills Progression	Expands from one tool/language to multiple technologies and communication skills
Career Mobility	Options to move into data engineering, science, or business analytics
Learning & Resources	Abundant resources available for growth and development

Viewpoints: Get into the Data Profession

Entry into the Data Profession: Personal Stories

Creating a Role by Identifying a Need

- The speaker's role as a data professional didn't exist previously.
- Noticed inefficiencies in the company's data reporting process:
 - o Data requests went through the IS department.
 - Long process: meetings to plan meetings, gathering requirements, unsatisfactory final products.

Solution:

- Developed a company database.
- Enabled analysts to access more information quickly.
- o Delivered reports within two weeks.
- o Addressed an unmet internal need for timely, efficient data.

From Economics PhD to Data Professional

- Originally pursuing a PhD in Economics at University of Illinois, Urbana-Champaign.
- Colleague recommended adding a Master's in Statistics.
- Entered the statistics program and discovered a strong passion.
- Career transition:
 - From economist aspirations to a data-focused career.
- Core areas of current work:
 - Data modeling

- Analytics
- Insight gathering
- Communication & visualization
- o Data-driven problem-solving

CN Accidental Entry into Financial Data Analysis

- Joined a financial data company in [inaudible], China.
- The company was hiring equity data analysts.
- Got the role due to financial analysis skillset.
- Later developments:
 - The team began hiring individuals with technical skills (Python, R, Sickle).
- Highlight:
 - Transition driven by both opportunity and evolving team needs.

🎔 Passion for Numbers and Data Storytelling

- Longstanding love for numbers.
- Belief: Numbers tell a story when you engage with them deeply.
- Attracted to data analytics through:
 - Excel, QuickBooks, other datasets.
 - Use of data to uncover insights in the financial industry.
- Use cases:
 - Analyzing profit/loss statements, balance sheets.
 - Mergers and acquisitions data tells the company's past and potential future.

Straight to Data Science After Grad School

- Educational path:
 - Master's in Data Science.

- o Previous experience as a Data Analyst and Analytics Manager.
- Current role:
 - Data Scientist
 - Secured directly after completing the grad program.

Summary

This video features several data professionals sharing how they entered the field, showcasing diverse paths, from self-created roles to academic pivots and accidental opportunities. Key takeaways include:

- Some roles are created by identifying unmet needs within a company.
- Academic backgrounds in economics, statistics, or data science often serve as a foundation.
- Passion for data and storytelling through numbers is a common trait.
- Industry-specific needs (e.g., financial sector) drive demand for both analytical and technical skills.
- Career paths are often non-linear, shaped by opportunity, curiosity, and evolving interests.

Topic/Section	What We Learnt				
Creating a Data Role	A role can be created by identifying inefficiencies and proposing better solutions.				
Transition from Economics to Data	Academic shifts can lead to discovering a passion for data analytics.				
Accidental Entry into Finance Analytics	Careers can begin unexpectedly, driven by available opportunities and skillsets.				
Love for Numbers and Storytelling	Passion for data can be rooted in interpreting the narrative behind numbers.				
Academic Route to Data Science	Specialized grad programs can directly lead to roles like Data Scientist.				
Skills in Demand	Financial analysis, technical tools (Python, R), and communication are valuable.				

Viewpoints: What do Employers look for in a Data Analyst?

What Employers Look for in a Data Analyst

S Integrity Over Deadlines

- **Key Hiring Question**: "Would you rather meet a deadline or get the right answer?"
- **Preferred Answer**: Get the correct answer, even if it means missing a deadline.
- Reasoning:
 - Wrong data can lead to:
 - Multi-million dollar mistakes.
 - Job losses due to incorrect reporting.
 - Integrity ensures trustworthy, accurate decisions.

Section 2 Clear Communication Skills

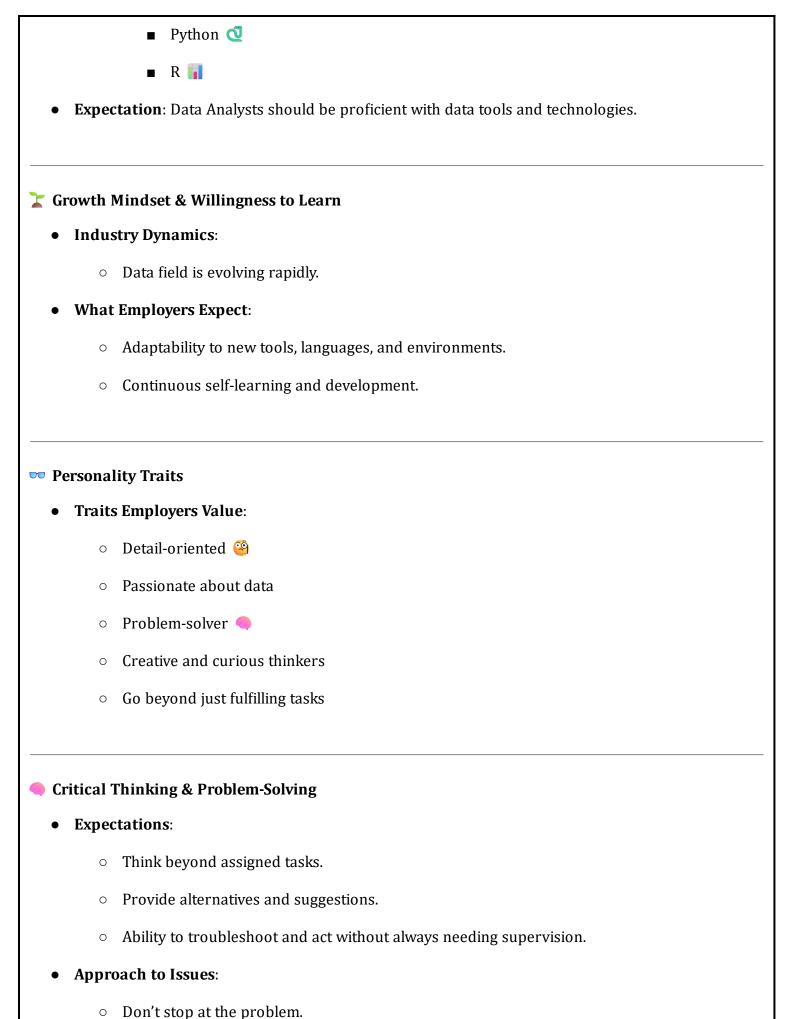
- **Importance**: Even brilliant analysis loses value if it can't be communicated clearly.
- Target Audience: External stakeholders need to understand findings.
- **Desired Trait**: Ability to convey technical insights in accessible language.

🔢 Fluency with Numbers & Analytical Thinking

- Essential Analytical Skills:
 - Comfort with numerical data.
 - Understanding complex analyses.
 - Interpreting A/B test results and their implications.

X Technical Skills

- Most In-Demand Tools:
 - **SQL**: Especially emphasized for data manipulation and querying.
 - **Programming Languages**:



• Present possible solutions and keep the work moving forward.

Adaptability and Dynamism

• Flexibility With Data Formats:

- Comfortable working with various data types and structures.
- Able to adjust to unfamiliar datasets quickly.

Cross-Tool Adaptability:

- Quick learning of new tools (e.g., switching from Python to R, or different SQL environments).
- Learning Agility: Ability to quickly acquire new technical skills and methodologies.

★ Summary

This video presents insights from data professionals on what employers seek in a Data Analyst. Integrity is highlighted as more crucial than meeting deadlines. Communication skills are essential, as even top-tier analysis must be presented clearly. Employers value technical proficiency (especially in SQL, Python, and R), fluency with numbers, and strong analytical thinking. Personality traits like being detail-oriented, problem-solving ability, and a growth mindset are also essential. Adaptability and the willingness to learn new tools and approaches round out the ideal candidate profile.

Key Takeaways:

- Integrity matters more than speed.
- Communication is as important as analysis.
- Technical skills (SQL, Python, R) are a must.
- A growth mindset and adaptability are key.
- Employers want problem-solvers who think beyond instructions.

Topic/Section	What We Learnt
Integrity	Prioritize correct data over meeting deadlines
Communication	The ability to clearly explain data insights to stakeholders is essential
Analytical Skills	Understand complex data, numerical fluency, and interpret A/B test results
Technical Skills	Proficiency in SQL, Python, R is highly valued

Growth Mindset	Willingness to learn and adapt in a fast-changing field
Detail Orientation	Precision and thoroughness in working with data are expected
Problem-Solving & Creativity	Think outside the box, troubleshoot, and provide alternatives
Adaptability	Quickly adjust to new tools, environments, and data structures
Independent Initiative	Take action without needing constant supervision

The Many Paths to Data Analysis

Entry Paths into the Data Analyst Field

1. Academic Route

• Degree Fields:

- Data Analytics
- Statistics
- o Computer Science
- o Management Information Systems
- o Information Technology Management

• Advantages:

- o Provides a strong foundational understanding
- Gives an edge in the job market

2. Non-Academic / Online Learning Route

• Online Learning Platforms:

- Coursera
- \circ edX
- Udacity

• Program Structure:

- Multi-course specializations
- Designed by domain experts

• Key Benefits:

- Learn at your own pace
- Real-world projects and hands-on assignments
- Build a portfolio using course projects
- o Gain entry-level opportunities without a degree

Gaining Skills & Advancing Your Career

3. Key Skills for Data Analysts

Technical Skills:

- Statistics
- Spreadsheets (Excel, Google Sheets)
- o SQL
- o Python
- Data Visualization tools (Tableau, Power BI, etc.)

Functional & Soft Skills:

- Problem-solving
- Communication
- Storytelling with data
- Making impactful presentations

4. Skill Enhancement Tips

- Advance knowledge gradually as you gain experience
- Choose focused courses in specialized areas
- Practice consistently with real-world data
- Join forums and communities of practice

Switching from Another Career Path

5. From a Non-Technical Role

• Examples:

- Sales → Sales Analyst
- Marketing → Marketing Analyst

Advantages:

o Brings valuable domain/industry experience

• Skill Building:

- Learn statistics and programming
- o Bridge technical skill gaps through online learning

6. From a Technical Role

• Advantages:

- Quick adaptability to tools and software
- Domain knowledge already in place

• Transferable Skills:

- Problem-solving
- Project management
- Communication
- Storytelling with data

Research & Planning

7. Steps to Make a Successful Career Switch

- Research the field of data analysis thoroughly
- Understand required knowledge, skills, and job roles
- Explore growth opportunities within the field
- Tap into online communities and network for insights
- Align your background with a relevant analyst role

Characteristics for Success

Curiosity

- Willingness to learn continuously
- Excitement about working with data
- Persistence despite lacking formal qualifications

Summary:

This content outlines multiple pathways to enter the data analyst field, emphasizing that formal academic qualifications, while helpful, are not mandatory. Aspiring analysts can pursue online programs from trusted platforms and build portfolios through hands-on projects. The field welcomes professionals from both technical and non-technical backgrounds if they can skill up appropriately. Whether you are starting fresh or making a lateral move, success in data analysis depends heavily on acquiring the right mix of technical and soft skills, staying curious, and being open to continuous learning.

Topic/Section	What We Learnt				
Academic Path	Degrees in data or tech-related fields provide a strong entry into data analysis.				
Online Learning Route	Platforms like Coursera and edX offer practical, expert-designed specializations.				
Skills Required	Includes stats, SQL, Python, visualization, storytelling, and soft skills.				
Career Switch – Non-Tech Background	Domain knowledge helps; start with a related analyst role (e.g., Sales Analyst).				
Career Switch – Tech Background	Easier tool adoption; apply existing domain and soft skills.				
Continuous Learning	Data analysis is dynamic—constant upskilling is key.				
Real-World Projects	Online courses include projects to enhance learning and portfolios.				
Networking & Research	Forums, mentors, and online communities can guide learning and career decisions.				
Personal Traits for Success	Curiosity, adaptability, and enthusiasm for data are essential for growth.				

Viewpoints: Career Options for Data Professionals

6 Overview of the Data Profession

- The data field is:
 - o Colorful, dynamic, and constantly evolving
 - Presents a wide range of career options for aspiring data professionals
- Career options span multiple roles based on interests and specialization

Career Tracks in the Data Field

1. Track 1: Data Analyst to Data Scientist

- Entry-level: Data Analyst
- Upskill to:
 - Data Scientist
 - Focus on advanced data analysis and modeling
 - o Machine Learning Engineer
 - Focus on ML modeling and engineering
- Alternative step:
 - Become a Statistician
 - More mathematically/statistically focused role

2. Track 2: BI Analyst to Data Engineer

- Start as a BI (Business Intelligence) Analyst/Specialist
- Upskill to:
 - Data Engineer
 - Focus on data pipelines, infrastructure, and engineering

3. Advanced Specializations

- Machine Learning Engineer
- AI Engineer
- Specialized Data Roles depending on business or technical focus

Solution Career Progression and Diversification

A. Progression from Data Analyst

- Become a Data Scientist or Machine Learning Engineer
 - o Focus on modeling and advanced data science
- Transition into **business strategy**
 - Use data to inform top-level decisions
 - Understand and analyze business-specific data deeply
- Take on **people management**
 - Manage and triage data workloads
 - o Ensure important questions are prioritized and answered

B. Non-Traditional or Related Paths

- Become a:
 - Bookkeeper
 - Accountant
 - CPA (Certified Public Accountant)
 - Stockbroker
 - Financial Analyst
 - Real Estate Broker
 - Note: These roles require strong data skills but are outside the core "data science" family.

Skills & Traits Required

- Must:
 - Love working with numbers
 - Be detail-oriented
- Not ideal for:
 - o Individuals who find numbers dull or hard to interpret

Summary

This video explores the **diverse career options** available to data professionals in today's ever-evolving data landscape. It emphasizes two primary career tracks—**Data Analyst to Data Scientist** and **BI Analyst to Data Engineer**—and highlights alternative roles such as Statistician, Machine Learning Engineer, and AI Engineer. Additionally, it covers progression opportunities like entering strategic business roles or managing data teams. It also notes related professions where data skills are crucial. Ultimately, success in this field requires a strong affinity for numbers and attention to detail.

Key Takeaways:

- Multiple career paths are available within the data profession.
- Two main tracks: Analyst-to-Scientist and BI-to-Engineer.
- Opportunities to transition into business strategy or leadership.
- Many related roles outside the traditional data science path.
- Strong numerical and detail-oriented skills are essential.

Topic/Section	What We Learnt					
Overview of Data Profession	The field is dynamic, evolving, and full of diverse opportunities					
Career Track: Analyst to Scientist	Data Analyst → Data Scientist → ML/AI Engineer or Statistician					
Career Track: BI to Engineer	BI Analyst → Data Engineer					
Career Progression Paths	Business strategy roles, people management, and technical specializations					
Related Professions	Bookkeeper, CPA, Stockbroker, Real Estate Broker, etc.					
Required Skills and Traits	Passion for numbers, detail-oriented mindset essential for success					

Viewpoints: Advice for aspiring Data Analysts

- **o** General Advice for Aspiring Data Analysts
 - Keep Learning & Stay Motivated
 - o Don't get discouraged by the vastness of the analytics field.
 - It's impossible to learn everything, so:
 - Take it slow.
 - Set a pace weekly, monthly, yearly to keep learning continuously.
 - Lifelong learning mindset is key to long-term success.
- The "T-Shaped" Career Framework
 - Visual Metaphor: Uppercase T
 - Top Horizontal Bar (Broad Knowledge)
 - Gain surface-level understanding in multiple areas:
 - A/B Testing
 - Machine Learning
 - Data Visualization
 - SQL
 - Python
 - R
 - Vertical Bar (Deep Specialization)
 - Choose at least one area from above and:
 - Develop deep, rigorous expertise.
 - Aim to be known for that skill or domain.
- Using Life & Job Experience as Learning Opportunities
 - Apply Analytics in Daily Life
 - Use real-life scenarios like:

- Analyzing a family budget.
- Checking checkbooks or financial documents.
- Exploring metrics at a part-time job (e.g., fast food).
- Observe and ask:
 - How many customers?
 - What's the revenue turnover?
 - What do the numbers mean?

• Turn Everyday Jobs into Case Studies

- Ask managers questions to understand the business side.
- Use these learnings as real examples during job interviews.

Building a Professional Portfolio

• Showcase Skills Publicly

- Create a portfolio that highlights:
 - Data analysis projects.
 - Real or simulated problem-solving experiences.
- Use public data sets:
 - Find interesting ones online.
 - Conduct your own analysis.
- Use your current job:
 - Look for opportunities to analyze data, even if not officially a data job.

Passion & Career Alignment

• Follow Your Interests

- Don't settle for any job just to be employed.
- Find roles that:
 - Meet personal and professional needs.
 - Spark joy and motivation each day.

- Data analyst roles are available in:
 - Numerous industries.
 - Different types of departments.
- There's flexibility to align your role with your interests.

Summary

This video features several data professionals sharing valuable advice for aspiring data analysts. The key takeaway is to embrace a mindset of continuous learning, build both broad and deep skillsets (T-shaped development), and apply analytics in everyday life. Creating a strong professional portfolio and aligning your career with personal passion are also highlighted as critical steps. These insights offer a roadmap to both personal fulfillment and professional growth in the field of data analytics.

Key Takeaways:

- Lifelong learning is essential.
- Be a T-shaped professional: broad skills + deep expertise.
- Leverage real-life situations for analytical practice.
- Build a strong, practical portfolio.
- Choose roles that align with your passions.

Topic/Section	What We Learnt	
Keep Learning	Learning in analytics is a continuous journey — aim to make small, consistent progress rather than mastering everything at once.	
T-Shaped Skill Development	Build broad knowledge across several domains and go deep in at least one specialized area for career resilience and expertise.	
Learning from Life Experience	Use real-world scenarios (family budget, fast food jobs) to practice analytics — every job can provide relevant experience.	
Professional Portfolio	Showcase your skills through personal projects or work-related analysis. I online datasets or real work scenarios to demonstrate capability.	
Passion and Job Fit	Don't take a job just for the sake of employment — find roles that excite you. There are plenty of data analyst jobs across industries to choose.	

Viewpoints: Women in Data Professions

& Introduction: Purpose of the Video

- Women data professionals share their:
 - Personal experiences in the field of Data Science.
 - Advice for aspiring women in data-related careers.

? Challenges Faced by Women in Data Science

- Persistent **gender stereotypes**:
 - Data Science is still seen by some as a "man's job."
- Real-life scenario:
 - A woman entered a meeting and observed **disappointment or confusion** in others' reactions.
- Positive spin:
 - She views skepticism as a chance to prove doubters wrong.

6 Overcoming Stereotypes

- Key qualities matter more than gender:
 - o **Insight, ability, drive** are essential to succeed.
- Encouragement to all:
 - Regardless of gender or race, the focus should be on producing quality work.
 - Everyone has the opportunity to prove their worth through performance.

🗫 The Importance of Finding and Using Your Voice

- Women often:
 - Struggle to **speak up** or hesitate due to fear of judgment.
- Advice:
 - Be **heard and seen**, not just loud.

- Speak when you have:
 - **Data to back up** your point.
 - Valuable ideas and content worth sharing.
- Visibility matters:
 - **Silent contribution** can often go unnoticed.
 - You must **showcase your drive and potential** through communication.

🤼 Representation and Progress in the Field

- Past situation:
 - Data science/engineering classes were male-dominated, especially in grad school.
- Present situation:
 - o Teams are now more **gender-diverse**, with more women in roles.

Continuous Learning and Growth

- Advice to women:
 - Keep upskilling.
 - If passionate about:
 - Programming
 - Data
 - Problem-solving
 - Then, focus on building technical competencies.
- Goal:
 - Be a **strong presence** in the data professional landscape.

O Don't Let Gender Be a Limiting Factor

- Gender should not be used as a **crutch**.
- Work hard, remain committed, and:

- Let your talent shine.
- There are **no roles restricted to specific genders**.
- If you enjoy your profession:
 - Pursue it with full enthusiasm and purpose.

Summary

The video presents the voices and experiences of women in Data Science, addressing the challenges of gender stereotypes in a traditionally male-dominated field. These professionals share their journeys, emphasizing the importance of competence, visibility, continuous upskilling, and self-confidence. They encourage aspiring women to believe in themselves, speak up, and let their work speak volumes. Gender should not define one's capabilities—talent, drive, and technical skills are what matter most.

Key Takeaways:

- Challenge stereotypes by showcasing your competence.
- Speak up to be seen and recognized.
- Gender should never limit professional growth.
- The field is becoming more inclusive.
- Upskilling is essential to remain competitive.

Topic/Section	What We Learnt
Gender Stereotypes in Data Science	Still prevalent, but can be challenged through performance and confidence.
Speaking Up	Crucial for visibility and progression—your voice matters.
Skills Over Gender	Insight, drive, and ability are the real criteria for success.
Representation in the Field	Increasing number of women in data teams compared to the past.
Importance of Upskilling	Continuous learning enhances credibility and career strength.
Empowerment Message	Don't let gender hold you back—pursue what you love with confidence and drive.

Generative AI for Data Analytics

Introduction: A New Era in Data Analytics

- **Theme**: Fusion of Artificial Intelligence (AI) and data exploration
- **Objective**: Revolutionizing understanding and interpretation of information
- Video Focus:
 - Define Generative AI
 - Explore applications of Generative AI in data analytics

What is Generative AI?

- Definition:
 - A category of AI focused on creating new synthetic data
- Difference from Traditional AI:
 - Traditional AI: Predicts or classifies based on existing data
 - Generative AI: Produces entirely *new* data points

Applications of Generative AI in Data Analytics

1. Synthetic Data Generation

- Solves the problem of limited data availability
- Augments existing datasets for more robust analysis
- Supports model training with enriched data

2. Missing Data Imputation

- Fills in missing data points
- Provides a more complete picture for analysts and data scientists

3. Data Representation Transformation

- Converts data across formats, e.g.:
 - Text to images

- Images to text
- Enables new ways to visualize and interpret complex information

4. Enhanced Data Preparation

- Automates and improves:
 - o Data cleaning
 - Normalization
 - Data transformation
- Streamlines the path from *raw data to insights*

5. Intelligent Querying

- Formulates complex queries
- Optimizes database interactions
- Adapts to evolving data structures
- Functions as a smart assistant for data querying

Generative AI for Q&A in Data Analytics

- Allows *natural language interaction* with data
- Generates meaningful responses to plain language queries
- Examples of AI Models:
 - o **GPT (OpenAI)**: Fine-tunable language model for Q&A tasks
 - o **BERT (Google)**: Pre-trained model excelling in contextual understanding

II Enhancing Data Visualizations

- Improves visual appeal and information clarity
- Enables *interactive visualizations* responsive to user input
- Contributions:
 - Generates visually engaging representations
 - Makes complex data more accessible

Tools and Examples:

- Tableau AI
- IBM Cognos AI Assistant
- Google Looker AI

Simplified Dashboard Creation

- Accelerates and enhances:
 - Dashboard layouts
 - Insightful widgets
 - Personalized experiences
- Improves data communication effectiveness

Storytelling with Data

- Adds narrative elements to analytics
- Highlights key insights
- Structures stories from raw data
- Enhances engagement and comprehension

Future of Generative AI in Data Analytics

- Automates exploratory data analysis
- Supports creation of compelling data narratives
- Reshapes interaction with data
- Establishes generative AI as a *catalyst for innovation*

Summary

This video introduces the powerful intersection of generative AI and data analytics. Generative AI is transforming the way we create, understand, and visualize data. Unlike traditional AI, it generates entirely

new data, offering immense potential in areas like synthetic dataset creation, data visualization, dashboard automation, intelligent querying, and storytelling. With tools like GPT and BERT, and platforms like Tableau AI and Looker AI, generative AI is not just enhancing analytics—it's redefining it. The future of data analytics lies in intelligent, dynamic, and creative AI-driven processes.

Table: What We Learnt in the Video

Topic/Section	What We Learnt				
Introduction to Generative AI	It creates synthetic data and goes beyond prediction/classification				
Synthetic Data Generation	Solves data scarcity; enriches training data				
Missing Data Completion	Fills in gaps to offer a complete dataset				
Data Representation	Transforms between formats like text and images				
Data Preparation	Automates cleaning, normalization, and transformation				
Querying with Generative AI	Forms complex queries; adapts to changes; acts as a data assistant				
Q&A Models	GPT and BERT models enhance understanding and response to user queries				
Visualization Enhancement	Makes visuals more interactive and appealing				
Dashboard Creation	Faster, dynamic dashboards with personalized layouts and widgets				
Data Storytelling	Adds narratives, highlights insights, and improves comprehension				
Future Outlook	Automates EDA, enhances narratives, and redefines interaction with data				

Summary and Highlights

In this lesson, you have learned the following information:

Data Analyst roles are sought after in every industry, be it Banking and Finance, Insurance, Healthcare, Retail, or Information Technology.

Currently, the demand for skilled data analysts far outweighs the supply, which means companies are willing to pay a premium to hire skilled data analysts.

Data Analyst job roles can be broadly classified as follows:

 Data Analyst Specialist roles - On this path, you start as a Junior Data Analyst and move up to the level of a Principal Analyst by continually advancing your technical, statistical, and analytical skills from a foundational level to an expert level.

- Domain Specialist roles These roles are for you if you have acquired specialization in a specific domain and want to work your way up to be seen as an authority in your domain.
- Analytics-enabled job roles These roles include jobs where having analytic skills can up-level your performance and differentiate you from your peers.
- Other Data Professions There are several other roles in a modern data ecosystem, such as Data Engineer, Big Data Engineer, Data Scientist, Business Analyst, or Business Intelligence Analyst. If you upskill yourself based on the required skills, you can transition into these roles.

There are several paths you can consider in order to gain entry into the Data Analyst field. These include:

- An academic degree in Data Analytics or disciplines such as Statistics and Computer Science.
- Online multi-course specializations offered by learning platforms such as Coursera, edX, and Udacity.
- Mid-career transition into Data Analysis by upskilling yourself. If you have a technical background,
 for example, you can focus on developing the technical skills specific to Data Analysis. If you do not
 have a technical background, you can plan to skill your self in some basic technologies and then
 work your way up from an entry-level position.

Final Assignment: Data Analysis in Action

Using Data Analysis for Detecting Credit Card Fraud

Companies today are employing analytical techniques for the early detection of credit card frauds, a key factor in mitigating fraud damage. The most common type of credit card fraud does not involve the physical stealing of the card, but that of credit card credentials, which are then used for online purchases.

Imagine that you have been hired as a Data Analyst to work in the Credit Card Division of a bank. And your first assignment is to join your team in using data analysis for the early detection and mitigation of credit card fraud.

In order to prescribe a way forward, that is, suggest what should be done in order for fraud to get detected early on, you need to understand what a fraudulent transaction looks like. And for that you need to start by looking at historical data.

Here is a sample data set that captures the credit card transaction details for a few users.

IP Address	User ID	Account Number	Age	Shipping Address	Transaction Date	Transaction Time	Transaction Value	Product Category	Units Purchased
3.56.123.0	johnp	25671147	32	1542, Orchid Lane, WA 98706, US	15-5-20	15:00:05	\$121.58	Clothing	1
3.56.123.0	johnp	25671147	32	1542, Orchid Lane, WA 98706, US	10-6-20	10:23:10	\$79.23	Electronics	2
3.56.123.0	johnp	25671147	32	1542, Orchid Lane, WA 98706, US	1-6-20	07:12:45		Home Décor	1
1.186.52.7	johnp	25671147	32	In-store	3-6-20	01:11:10	\$2,009.99	Electronics	10
	johnp	25671147	32	In-store	2020-06-03	01:15:12	\$4,131.00	Electronics	15
1.186.52.7	johnp	25671147	32	P.O. Box 1049	03-06-2020	01:22:24	\$3,010.50	Tools	20
1.58.167.2	davidg	51422789	47	90 Robinson Blvd, Alberta, 97602, Canada	15 May 2020	17:02:08	\$234.20	Furniture	1
1.58.167.2	davidg	51422789	47	90 Robinson Blvd, Alberta, 97602, Canada	18 May 2020	19:12:45	\$141.00	Kithcen Supplies	3
	davidg	51422789	47	90 Robinson Blvd, Alberta, 97602, Canada	01 June 2020	17:34:15	\$157.25	Car Spares	2
1.58.167.2	davidg	51422789	47	90 Robinson Blvd, Alberta, 97602, Canada	13 June 2020	18:02:10	\$59.99	Kithcen Supplies	1
172.165.10.1	ellend	11568528		P.O. Box 1322	07 June 2020	15:53:12	\$99.99	Clothing	1
172.165.10.1	ellend	11568528		P.O. Box 1322	08 June 2020	17:15:30	\$53.15	Beauty	1
1.167.255.10	ellend	11568528		P.O. Box 5401	02 July 2020	00:05:10	\$4,895.00	Laptop	1

Descriptive techniques of analysis, that is, techniques that help you gain an understanding of what happened, include the identification of patterns and anomalies in data. Anomalies signify a variation in a pattern that seems uncharacteristic, or, out of the ordinary. Anomalies may occur for perfectly valid and genuine reasons, but they do warrant an evaluation because they can be a sign of fraudulent activity.

Past studies have suggested that some of the common events that you may need to watch out for include:

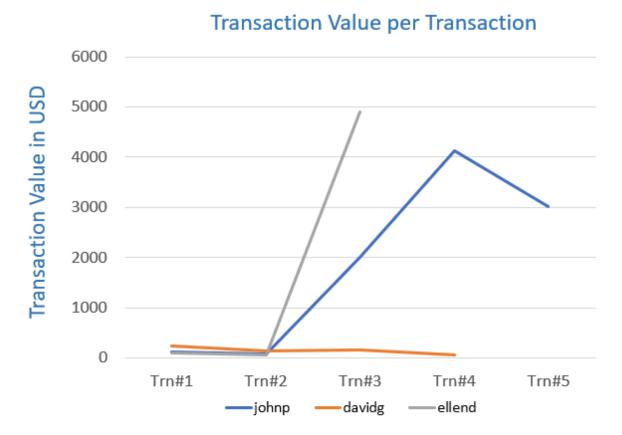
- A change in frequency of orders placed, for example, a customer who typically places a couple of orders a month, suddenly makes numerous transactions within a short span of time, sometimes within minutes of the previous order.
- Orders that are significantly higher than a user's average transaction.
- Bulk orders of the same item with slight variations such as color or size—especially if this is atypical of the user's transaction history.
- A sudden change in delivery preference, for example, a change from home or office delivery address to in-store, warehouse, or PO Box delivery.
- A mismatched IP Address, or an IP Address that is not from the general location or area of the billing address.

Before you can analyze the data for patterns and anomalies, you need to:

- Identify and gather all data points that can be of relevance to your use case. For example, the card holder's details, transaction details, delivery details, location, and network are some of the data points that could be explored.
- Clean the data. You need to identify and fix issues in the data that can lead to false or incomplete findings, such as missing data values and incorrect data. You may also need to standardize data formats in some cases, for example, the date fields.

Finally, when you arrive at the findings, you will create appropriate visualizations that communicate your findings to your audience. The graph below samples one such visualization that you would use to capture a

trend hidden in the sample data set shared earlier on in the case study.



In the next section you will be asked to answer the following 5 (five) questions based on this case study:

- 1. List at least 5 (five) data points that are required for the analysis and detection of a credit card fraud. (3 marks)
- 2. Identify 3 (three) errors/issues that could impact the accuracy of your findings, based on a data table provided. (3 marks)
- 3. Identify 2 (two) anomalies, or unexpected behaviors, that would lead you to believe the transaction may be suspect, based on a data table provided. (2 marks)
- 4. Briefly explain your key take-away from the provided data visualization chart. (1 mark)
- 5. Identify the type of analysis that you are performing when you are analyzing historical credit card data to understand what a fraudulent transaction looks like. [Hint: The four types of Analytics include: Descriptive, Diagnostic, Predictive, Prescriptive] (1 mark)

Course Wrap-Up

Congratulations and Next Steps

Congratulations on completing the course! We hope you enjoyed it.

This course is part of:

- IBM Data Analysis and Visualization Foundations Specialization
- IBM Data Analyst Professional Certificate

As a next step, you can explore other courses in these programs, starting with <u>Excel Basics for Data Analysis</u>.

If you are looking to understand and practice the basics of Data Analysis without any programming, we encourage you to complete the 3-course IBM Data Analyst Foundations Specialization. But if you are looking to start a career as a Data Analyst, the 8- course IBM Data Analyst Professional Certificate will empower you with the skills to become job-ready in this field.

We encourage you to leave your feedback and rate the course

Course Credits and Acknowledgements

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