ANALYTICS TOOLS

What are analytics tools and how are they related to Data Knowledge and Analysis?

The practice of analytics uses insights gained from data analysis to identify and anticipate trends and outcomes for making smarter, data-driven business decisions. Analytics software tools are available to make this more efficient by reducing manual computational tasks for gathering and analyzing the data.

Vocabulary

- **Business analytics (BA)** – focuses on predictive and prescriptive analysis of data
- **Business intelligence (BI)** – focuses on descriptive and diagnostic analytics
- **Descriptive analytics** – uses data to understand what has happened in the past
- **Diagnostic analytics** – uses data to understand what is happening now
- **Predictive analytics** – uses data to predict what could happen in the future
- **Prescriptive analytics** – uses data to support recommendations for actions that should be taken to improve future outcomes

How will technicians use analytics tools?

Lisa is a building technician for a commercial property management company in a fast-growing metropolitan area with many new office buildings. These new buildings typically are installing what is called a DDC or direct digital control systems. A DDC controls one or more building systems, including HVAC (heating, ventilation, and air conditioning), fire alarms, and security systems using sensors that transmit data to a remote computer workstation with specialized software where a technician can monitor the system. Lisa recently needed to troubleshoot an HVAC problem when one of the tenants complained it was chilly in their office in the morning. Lisa used data from the DDC to determine the temperature on their floor over the past several weeks. The data showed the HVAC system was adjusting to 65 degrees at 6:00 pm and was re-adjusting to 72 degrees at 8:00 am. Lisa also examined security data from the DDC and noticed that three employees had begun arriving earlier to work than in the past, at 7:30 am rather than 8:30 am when the rest of the employees arrived. This meant the temperature in the office was seven degrees cooler than the 72 degrees for which it was set for during the company's office hours of 8:30-5:00. Lisa shared this insight with the office manager. The office manager stated they recently hired three new employees to work an earlier shift. Lisa adjusted the DDC from her workstation to go back to 72 degrees at 7:00 am to ensure the office was more comfortable for all the employees. In this case, Lisa used a combination of descriptive and diagnostic analytics to solve the problem.





ANALYTICS TOOLS

Skills Needed for a High-Paying Career

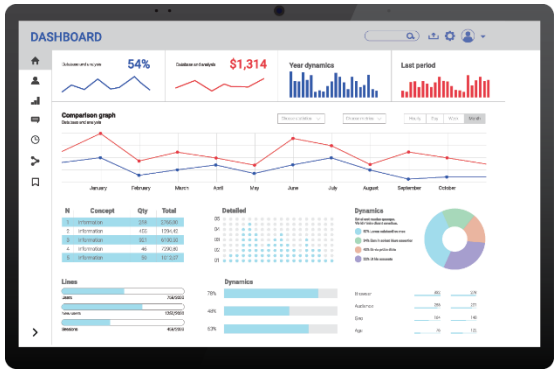
- Comparing and selecting appropriate analytics tools
- Writing basic R and Python scripts to import and summarize data
- Interpreting statistics
- Using tools like Excel, PowerBI, or Tableau to import and analyze data
- Creating data visualizations, reports, and dashboards
- Translating data analytics into actionable business recommendations

Education

Your local community college provides the advanced technology classes you will need. The number of associate degree programs in Data Analytics is growing but the required skills are often taught within Data Science or Computer Information Science programs. Many colleges offer short courses as well. You'll find applicable skills in technical specializations, such as cybersecurity, biotech, advanced manufacturing, and energy technologies. Community college course schedules are designed to accommodate the needs of working students and often include online and hybrid delivery formats. Find your nearest community college here.

Future Trends

The future of analytics tools will include:



- A focus on data quality management
- An increase in predictive and prescriptive analytics capabilities
- Hyperconnected tools sharing data more widely via the Internet of Things (IoT) and cloud technology
- Increased automation of analytical processes
- Artificial intelligence (AI) equipped tools

Learn More

- What is Business Analytics? Using Data to Predict Business Outcomes
- What is Manufacturing Analytics?

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ANALYTICS TOOLS

What are analytics tools?

Analytics software takes "big data" and uses Artificial Intelligence (AI), statistical and quantitative analysis, explanatory and predictive models, and fact-based management to drive decisions and actions.

Analytics Competencies

- Comparing and selecting appropriate analytics tools
- Writing Basic R and Python scripts to import and summarize data
- Using tools like Excel, PowerBI, or Tableau to import and analyze data
- Creating data visualizations, reports, and dashboards
- Translating data processed using analytics tools into actionable business recommendations

Cross-disciplinary Skills

- Basic programming
- Using spreadsheets
- Interpreting statistics
- Selecting and using analytics tools
- Communicating effectively with internal and external stakeholders

Agriculture Scenario

Dan is a Fisheries Technician on a salmon farm. He was researching ways the farm could economize feeding their fish and found a company that had advanced aquatic technologies that can collect and analyze feeding behavior data using sensors, underwater cameras, and data analytics software. His supervisor agreed that having those tools could provide them with greater insight into the feeding patterns, resulting in raising healthier fish, saving money, and increasing the farm's efficiency. Dan worked closely with the aquaculture technologies company to set up the system to evaluate feeding behavior of the fish based on water temperature and dissolved oxygen, to find out when the fish were reaching satiation, and to determine the quantity of pellets left uneaten and falling to the bottom of the pens. The analytics software saved all the data and uploaded it to a secure private cloud. Dan was able to obtain descriptive and diagnostic analytics data and provide information to the company to help them optimize their fish feeding strategies.

Information Technology Scenario

Cameron is a Network Technician for a locally owned group of five automotive repair shops that specialize in hybrid vehicles. They have a client/server network configuration enabling all the shops to share a common customer database, maintenance records, accounting system, and office software package. Over the past two weeks, the server went down several times and Cameron needed to get to the bottom of what was causing the outages and take action to resolve the problem. Cameron used network monitoring agents and software to gather and analyze network data. Agents are small pieces of equipment located at each shop that monitor the network at that location. Monitoring software takes that information, runs metrics, and reports issues, with details about what the issue is and what caused it. Cameron was able to determine that the outages stemmed from bandwidth overload at one of the shops where they were receiving a large number of repair records transferred electronically from another shop. While both shops completed their end of the file transfer process, Cameron didn't expect the issue to continue but he communicated to the shop managers that they should consider using the cloud in the future as the business continues to grow.

ANALYTICS TOOLS

Activity

This activity is designed to help students use analytics tools by exploring an open-source Tableau dashboard from a manufacturing company. Begin by reviewing the terminology from the student card. Next, the students will get into small groups and explore the Tableau dashboard. Then they will work in groups to explore the descriptive and diagnostic analytics of production stops using data from the dashboard.

Warm-Up

Review the vocabulary and concepts provided on the student card. Ask students to share any stories they have from school, work, or home where analytics tools were used, though they may not have necessarily called it by its formal name.

Activity Steps

1. Ask the student to think about how the four types of analytics can be used to make decisions regarding pieces of equipment, such as timing of repairs or if a machine needs to be replaced.
2. Have students go to this public Tableau workspace on Manufacturing Analytics where they will find an open source data analytics dashboard from a manufacturing facility. This dashboard provided data visualization regarding times the machines are not working.
3. Break students into small groups to explore the interactive dashboard together.
4. Next, in their groups, have them identify:
   - Descriptive analytics – What has happened?
   - Diagnostic analytics – Why is it happening?
5. Then, have the groups work together to hypothesize:
   - Predictive analytics – What could happen?
   - Prescriptive analytics – What should happen?
6. Each group presents their findings to the class.

Tools Available

- Excel, Power BI, and Tableau are common tools used for analytics.
- Basic Python and R are open-source programming languages for analytics. Python Vs. R: What's the Difference?
- A variety of proprietary tools are available in the market.
  Top 10 Business Analytics Tools Used by Companies Today

Read More

- Business Analytics: What It Is and Why It's Important

ABOUT THE PROJECT

Preparing Technicians for the Future of Work, funded by the National Science Foundation Advanced Technological Education program, recognizes that technicians need an expanded skill set to remain competitive. The project's Framework for a Cross-Disciplinary STEM Core outlines recommendations for incorporating knowledge and skills in Advanced Digital Literacy, Data Knowledge and Analysis, and Business Knowledge and Processes. Learn more about implementing the Framework at preparingtechnicians.org.