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A FUTURE IN
DATA SCIENCE

WHAT IS DATA SCIENCE?

Today, data is everywhere. All of us create and consume data in our everyday lives as we work, socialise, shop and drive. A tremendous amount of data is also produced by inanimate objects such as cameras and sensors.

From a road map for a lost driver to a huge dataset for a corporation, data science deals with the collection, manipulation and presentation of every type of data. It combines multiple disciplines to acquire insights and knowledge to help make predictions for the future of a business, community and/or humanity.

The field of data science provides the expertise to navigate and make sense of an ever-increasing sea of data. The data scientist explores and extracts data, then analyses it to creatively solve complex problems. They then communicate the solutions to non-technical colleagues and clients. These solutions can be used to support strategic decision making in every aspect of business.

However, data science goes beyond simple analysis and computation. Its primary goal is to improve business practices and enable business decisions based on appropriate data. For example, KPMG has a data analytics team providing services for clients such as identification of fraud, waste or abuse, assessment and enhancement of financial and data models, data migration planning and revenue leakage analysis.

Data science includes various disciplines. Statistics is used to gather, review, analyse, and draw conclusions from data. Data science techniques automatically uncover patterns hidden in data, while artificial intelligence methods reveal knowledge deeply embedded in data.

Are you a problem solver? Do you like puzzles and games involving logical thinking, and working with people to help solve their problems? Are you generally curious and driven toward making an impact through your work? If you are interested in shaping the way that data is gathered and organised, and knowledge is discovered, then a data analyst career could be for you.

OUTLOOK AND TRENDS

Critical skills shortages

The technology industry faces a critical shortage of skills in the areas of statistics and data science. Database administrator, business analyst, systems analyst, analyst programmer and developer programmer roles are listed on Immigration New Zealand's long-term skill shortage list, indicating high demand here.

The skills are twofold. Data scientists, who spend more time on computer algorithms than they do with people, need advanced analytics skills in statistics, computational mathematics or predictive analytics.

On the other hand, business analysts/managers spend more time interfacing with people than computers. They need a basic understanding of business analytics but often work on broader business questions and driving decisions in the business world.

Big data needs

Many companies are collecting massive amounts of data, but many are strapped for resources when it comes time to organise data in a practical way. Data analysts, data scientists and data engineers are needed to work with the expanding volumes and variety of data being collected.

Predictive analytics

It has become essential for businesses to predict and anticipate trends, to make proactive decisions and better shape outcomes. The increasing amounts of data collected is creating a demand for data analysts and scientists.

Cloud-based analytics and storage

Interest in moving data and business applications to the cloud has accelerated over the past two years. Platforms such as Amazon Web Services and Microsoft Azure help businesses save on infrastructure design, set up, and management costs. As cloud computing continues to move into the mainstream, there will be an even greater demand for workers skilled in cloud computing, as well as cloud security.

Source: TDWI Data Research and Education

Key concepts

Data science is the extraction of knowledge from structured and unstructured data using scientific methods, processes, algorithms and systems.

Artificial intelligence covers approaches to knowledge representation. It also presents strategies for general problem-solving using goal-oriented approaches.

Nature inspired computing uses inspiration from nature to present a series of sophisticated algorithms for solving optimisation problems and for machine learning.

Data mining and knowledge engineering builds on ideas from information science and presents key machine learning approaches to pattern extraction from data.

Text and vision intelligence focuses on practical algorithms, tools and systems of text and vision intelligence.

WORK SETTINGS

Work opportunities can be found in a wide array of sectors and industries, including financial and business management, engineering and industrial, building and construction, government agencies, research and education.

Graduates work for a wide range of organisations, including specialist ICT companies, private companies offering computer, database and network services to clients, software companies including entertainment and gaming specialists, start-ups, computer consultancies and telecommunication companies. Large organisations offer many advancement opportunities. You could start in a technical graduate role, then advance to senior or management positions.

CAREER ROLE EXAMPLES

IT graduate analyst – supports reporting and analytics functions and contributes to the ongoing improvement of business analysis processes in the organisation. Determines appropriate solutions that meet end users' specific requirements, while also ensuring the security and integrity of business data and engaging in other change projects as required.

Data analyst / data insights analyst – uses SQL, Excel, Python to assess quality and meaning of data. May also work with other tools, including R and SPSS, to identify, analyse and interpret patterns and trends in complex data sets. Works directly with the marketing, IT and business intelligence teams, presenting to a variety of stakeholders on a regular basis. Regularly prepares a variety of reports. Has a core statistical and analytic focus.

Data scientist – interprets patterns in data, communicating results to end users in a clear and logical format. Involves familiarity with big data platforms for data management, data visualisation and data mining using methods from machine learning. A multi-faceted role requiring many skill sets.

SKILLS AND KNOWLEDGE

Technical skills

- Ability to analyse an organisation's overall business needs, and establish how to best contribute to these with data and information management

- Knowledge of design methods for database management, knowledge of artificial intelligence methods and algorithms

- Detailed technical understanding of data mining concepts including machine learning algorithms for data and text mining

- High level knowledge of statistics (SAS, SPSS, R and Excel) quantitative methods, predictive analytics, data reporting

- Database applications including SQL, mining, data import, table creation, query creation and macros

People and communication skills

- Competent in oral and written communication, with good presentation skills

- Able to work well under pressure

- Able to work well as part of a team, and with minimal supervision

- Confident in problem-solving and decision-making

PERSONAL QUALITIES

- Personable and comfortable in a client-facing role
- Strongly investigative
- Able to see patterns and trends in data
- Excellent attention to detail
- Interested in mathematical modelling
- Quick to learn
- Logical, analytical and methodical

SALARY GUIDE

	Salary (per year)
Data analyst	$52,000–$80,000 (0–3 yrs)
	$80,000–$100,000 (3–7 yrs)
Data scientist	$55,000–$72,000 (0–3 yrs)
	$74,000–$100,000 (3–7 yrs)
Business analyst	$56,000–$78,000 (0–3 yrs)
	$75,000–$100,000 (3–7 yrs)

Sources: Potentia 2021 Remuneration Report/Jobtet/Careers NZ

Salary range is an approximate indication of the New Zealand job market at the time of publication (early 2022) and should only be used as a guideline.

THE AUT APPROACH

All students complete a research and development project in their final year, which brings together the knowledge and skills developed throughout the degree in a project for an industry or research centre client. Students work in teams as consultants, often on a wide range of exciting computing projects with companies such as Fisher & Paykel Healthcare Ltd, Eagle Technology and FutureTech, where they are supervised by AUT staff.

FURTHER STUDY OPTIONS

Further specialised study programmes include the Graduate Certificate and Graduate Diploma in Computer and Information Sciences, Master of Computer and Information Sciences, Master of Information Technology Project Management, Master of Information Security and Digital Forensics, and Doctor of Philosophy in Data Science.

Recent research includes natural language processing and generation, mining high speed data streams, time series prediction, artificial intelligence and video and image processing.

CELINE HARRISON

Data Engineer, ezyVet

Bachelor of Computer and Information Sciences in Computational Intelligence* with a minor in Software Development

"I have been at ezyVet for a year; a cloud-based practice management veterinary service that provides the tools necessary to help vets do what they do best – help animals.

It's my first role after graduating, however I did a couple of internships during my studies.

I'm a bit of a data nerd. I love being able to work with great data to analyse and transform into great tools or products. I've also got into machine learning recently. I find it really awesome working with existing data to predict future data.

My role is in two parts. I work within the conversion team at ezyVet which is responsible for converting clients' data when they join us. It's an ETL (extract, transform, load) process where we extract the data from their existing source system, transform it into MySQL using our extraction tool written in C#, and then convert (load) into the ezyVet database using our custom-built PHP scripts.

The second part of my role is my data project. Each member of the team gets their own data project and mine is around machine learning with the data we have within ezyVet. I'm doing an analysis around the breeds and species data we have to make sure our customers' data is in the best possible form, as well as being analysable to the internal team.

I love the variety of work in the conversion space as well as new and exciting challenges within machine learning. I also love the opportunities this role has brought so far, such as being a part of the ezyVet team for the AWS DeepRacer League where we spent a week racing virtual cars trained with AI!

One of the biggest challenges is getting your foot in the door to get your first role in the tech field. However, there's many resources available such as the Elab where you get help with your CV and interview prep. Summer of Tech is also great for finding internships while you are still studying."

*The Computational Intelligence major has been replaced with the Data Science major.

EMPLOYER COMMENT

"Our data engineers need to know at least one programming language reasonably well, have some SQL knowledge and understand the principles of Object-Oriented Programming.

They also need experience, ideally to have completed one or two internships or worked in software or data engineering or in a data role. We like people who are prepared to learn and adapt because we operate in a fast-paced environment.

Celine met all these requirements. She had completed two internships, had some experience with machine learning and is adaptable and a quick learner. She also had a base understanding of SQL and of Python and could answer the object-oriented questions in the interview."

John Lee
ezyVet Development Manager

USEFUL WEBSITES

IT Professionals NZ
https://itp.nz

KD Nuggets (Data Mining, Analytics, Big Data, and Data Science)
www.kdnuggets.com

Kaggle – the home of data science
www.kaggle.com

FURTHER INFORMATION

For the most up-to-date information on data science and the Bachelor of Computer and Information Sciences, visit www.aut.ac.nz/data-science

EMPLOYABILITY & CAREERS
For other Future Career Sheets visit:
www.aut.ac.nz/careersheets
For employability and career support, AUT students can book an appointment through https://elab.aut.ac.nz/

FUTURE STUDENTS
Contact the Future Student Advisory team for more information: www.aut.ac.nz/enquire
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The information contained in this career sheet is correct at time of printing, May 2022.