University of South Australia

Big Data Analytics

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What is Big Data analytics?

- A broad term that encompasses the **processes**, **technologies**, **frameworks** and **algorithms** to extract meaningful insights from data.

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Analytics tools – lots of choice

But… analytics is not about the tools!

3

Types of analytics

Information	Insights	Decision	Action

What happened?

DESCRIPTIVE Analytics
Reports
Alerts

Inquisitive Analytics
Queries
Data Mining

Why is something happening?

PREDICTIVE Analytics
Forecasts
Simulations

What is likely to happen?

So what? Now what?

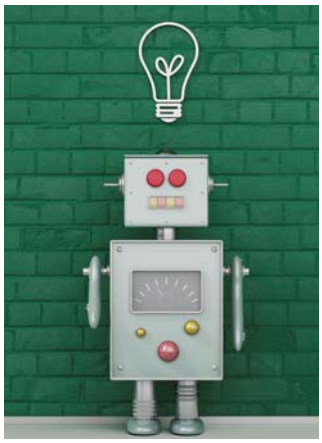
PRESCRIPTIVE Analytics
Optimisation
Planning

Pre-emptive Analytics

What is required to do more?

4

Machine learning



- A method of data analysis that **automates** analytical model building.
- A **branch of artificial intelligence (AI)** based on the idea that systems can learn from data, identify patterns and make decisions with minimal human intervention.

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Supervised learning

- Algorithms are trained using 'labelled' data – inputs where desired outputs are known.
- Patterns used to predict the values of the label on additional 'unlabelled' data.
- E.g. anticipate when credit card transactions are likely to be fraudulent.
- E.g. **classification** and **regression**.

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Unsupervised learning

- Used against data that has no ‘labels’.
- Explore the data to find a structure within that data.
- For example, identify segments of customers with similar attributes who can then be treated similarly in marketing campaigns.
- E.g. **nearest-neighbour** or **k-means clustering**.

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Other types of machine learning

- **Semi-supervised**
  Uses both labelled and unlabelled data.
- **Reinforcement learning**
  Trial and error to discover actions with highest ‘rewards’.

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Artificial Intelligence (AI)

- Human-like intelligence displayed by software or machines.
- Powered by **Big Data** and **machine learning**.
- Used in a broad range of industries to **make decisions** critical to life, death and personal wellness.

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Explainable Artificial Intelligence (XAI)

- Emerging field in machine learning.
- Making the 'black box' of AI transparent.
- A built-in model able to give a **transparent report** of why it took specific decisions.
- **Traceability** to allow humans to stop or control tasks when needed.

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Data visualisation


- Representation and presentation of data to **facilitate understanding**


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Visualisation for analysis

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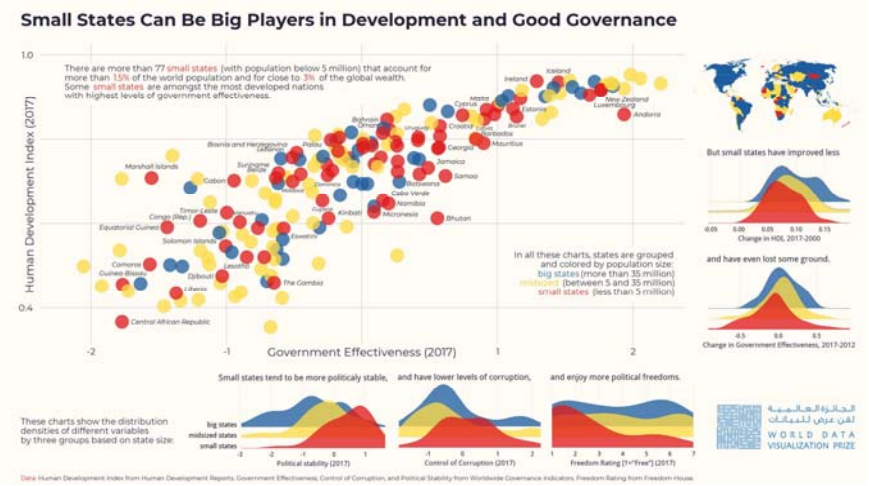
Visualisation for communication



World Data Visualization Prize

Static Category
Winner 2019 –
Dimiter Toshkov

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WARNING

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