# RioTinto

Rio Tinto on Market Analysis Sharing





# **AGENDA**



- Sentiment analysis background
- Solution Demo



Dr. Jingyuan Zhao VP, Insights & Data APAC

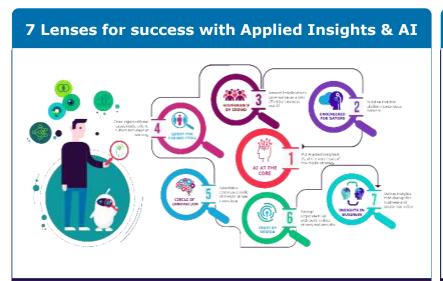


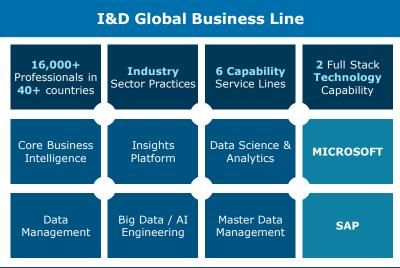
Rajeswaran Viswanathan Head, AI CoE, India

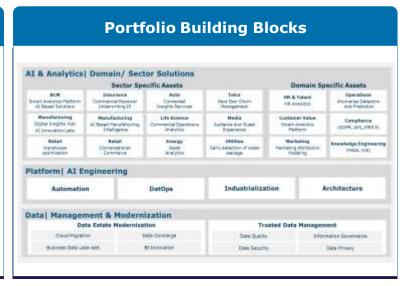


## Capgemini Insights and Data Business Unit



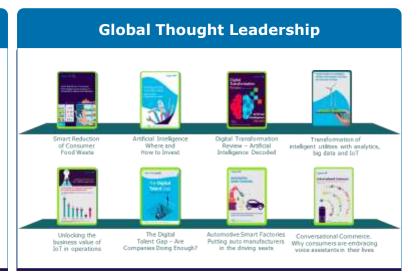












## In our globally deployed portfolio, we cover the full lifecycle of our clients' data & AI powered transformation





## **Strategy for Scale** (AI & Data Activate)

- Activation of clients' Data & AI strategy through mobilization, innovation, skills development and delivery model scaling
- DataOps and MLOps approaches to deliver faster from data sources to Data & AI powered actions

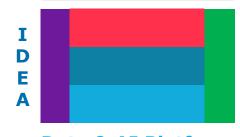
#### **Transformation** (Data Estate & BI Modernization)

- Data Estate Modernization to Simplify & Modernize to Industrialised Cloud Native Data & AI platforms
- Next Gen Enterprise Data & AI platform architecture to leverage the power of Cloud native data & AI services while leveraging existing investments

#### **Data & AI Activation For Business Outcomes** Assisted Risk **Immersive** Augmented Customer & Fraud 8 Workforce Experience Management 9



## **MLOps DataOps**



**Data & AI Platform Trusted, Secure & Scalable** 



- AI, Analytics, DS & Augmented BI (AI, Analytics & Data Science, 890)
- AI, Analytics and Data Science Automate and scale clients' ability to make trusted decisions and predictions
- Entreprise Knowledge Graphs preparing Data for AI by bringing siloed data together
- Augmented BI & Data Visualization Bring story-telling to data to make better informed decisions
- Key asset: 890 AI & Analytics Marketplace

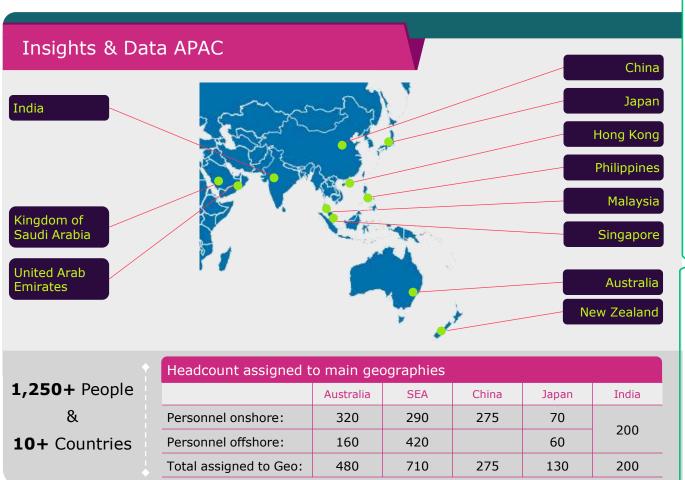
Transforming Data	AI, Analytics, Data Science, BI solutions
for Business Outcomes	Data & AI platforms

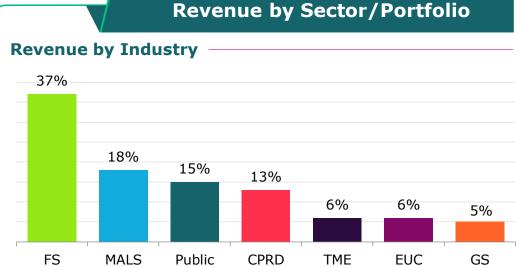
#### **Data & AI Platforms & Services** (AI & Data Engineering, MDM)

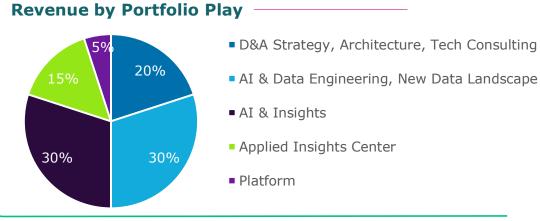
- **Data Ingestion** Capture, manage, share all types of data
- **Data Governance** Trust, security, compliance
- **Data Quality –** Clean data for quality decisions
- Intelligent Master Data Management Unify referential data from multiple internal and external sources
- Key asset: IDEA Deep Industrialization of **Data & AI Platforms**

# Capgemini's Insights & Data

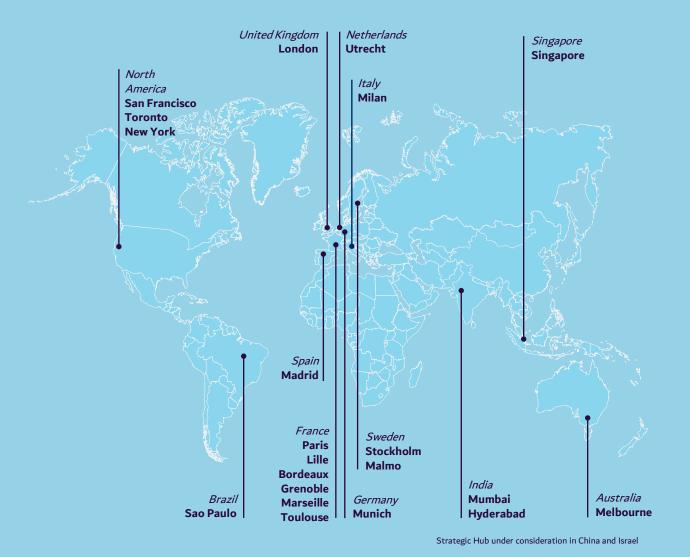
Our APAC Team







# Capgemini Applied Innovation Exchange network



Through our Applied Innovation Exchange ecosystem, we engage with business and technology stakeholders to help translate their innovation roadmaps into scalable use cases.



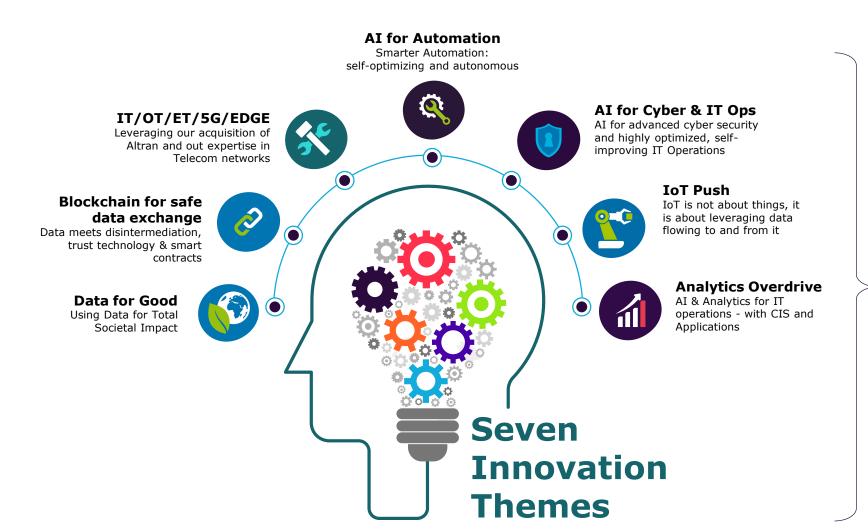
Fueled by a thriving open innovation ecosystem





# Cycle of Data Driven Innovation

Kick-start innovation with a catalog of selected and tested ready-to-go innovation topics and solutions



## **High-Speed**

Pre-defined use cases to kickstart innovation with start-up speed on 7 selected innovation themes - and more

#### Show, don't tell

Demos, exemplifications and visual presentations providing a unique experience

#### Hands-on

Lab setting to deliver innovations that the organizations can adopt and scale

#### **Innovation Ecosystem**

Leveraging the global Applied Innovation Exchange network



# **Sentiment analytics: Introduction**



## Introduction to Sentiment Analysis

## Sentiment analysis is the detection of **attitudes**

"enduring, affectively colored beliefs, dispositions towards objects or persons"

- **Holder (source)** of attitude
- **Target (aspect)** of attitude
- **Type** of attitude
- From a set of types
  - Like, love, hate, value, desire, etc.
- Or (more commonly) simple weighted polarity:
  - positive, negative, neutral, together with strength
    - **Text** containing the attitude
- Sentence or entire document

## Sentiment Analysis



# Simplest task:

•Is the attitude of this text positive or negative?

# More complex:

•Rank the attitude of this text from 1 to 5

# Advanced:

Detect the target, source, or complex attitude types

# Why sentiment analysis?



*Movie*: is this review positive or negative?

*Products*: what do people think about the new iPhone?

Public sentiment: how is consumer confidence? Is despair increasing?

*Politics*: what do people think about this candidate or issue?

*Prediction*: predict election outcomes or market trends from sentiment

## Scherer Typology of Affective States



**Emotion**: brief organically synchronized ... evaluation of a major event

angry, sad, joyful, fearful, ashamed, proud, elated

**Mood**: diffuse non-caused low-intensity long-duration change in subjective feeling

• cheerful, gloomy, irritable, listless, depressed, buoyant

**Interpersonal stances**: affective stance toward another person in a specific interaction

• friendly, flirtatious, distant, cold, warm, supportive, contemptuous

**Attitudes**: enduring, affectively colored beliefs, dispositions towards objects or persons

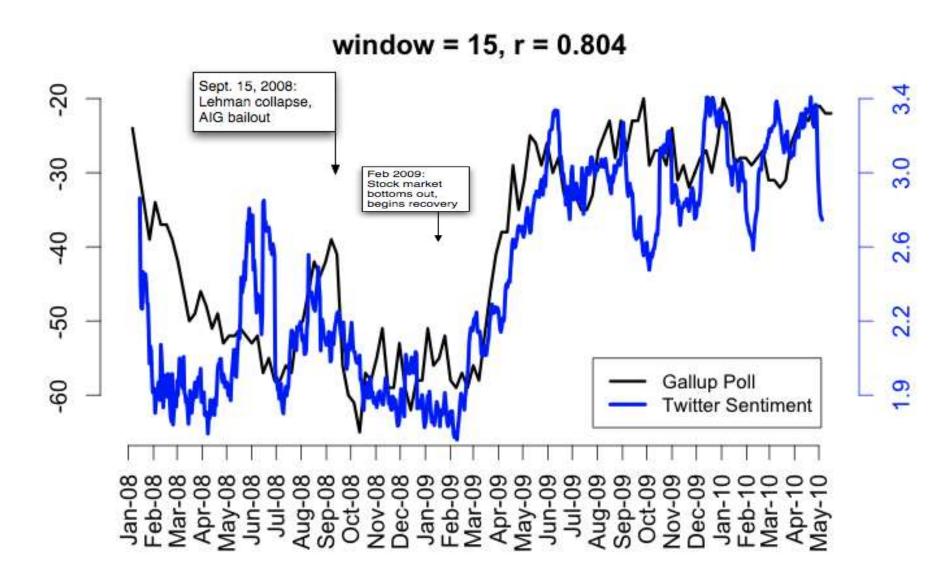
liking, loving, hating, valuing, desiring

**Personality traits**: stable personality dispositions and typical behavior tendencies

nervous, anxious, reckless, morose, hostile, jealous



## Twitter sentiment versus Gallup Poll of Consumer Confidence







## Why is it hard?



## Subtlety

## Perfume review

"If you are reading this because it is your darling fragrance, please wear it at home exclusively, and tape the windows shut."

## Movie review

"She runs the gamut of emotions from A to B"

## Thwarted Expectations and Ordering Effects

"This film should be brilliant. It sounds like a great plot, the actors are first grade, and the supporting cast is good as well, and Stallone is attempting to deliver a good performance. However, it can't hold up.

Well as usual Keanu Reeves is nothing special, but surprisingly, the very talented Laurence Fishbourne is not so good either, I was surprised.



Sentiment analytics: Historical approach

# Use libraries with words marked for polarity



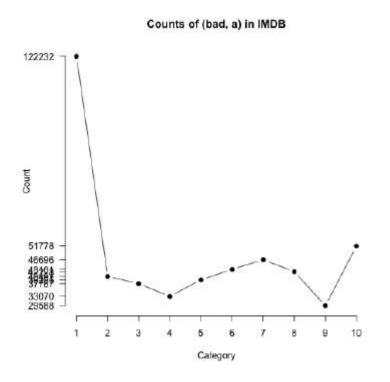
Many different groups have tried to identify words and their polarity. Some famous solutions are

Name	URL	Notes
The General Inquirer	http://www.wjh.harvard.edu/~inquirer/	<ul> <li>Positive (1915 words) and Negative (2291 words)</li> <li>Strong vs Weak, Active vs Passive, Overstated versus Understated</li> <li>Pleasure, Pain, Virtue, Vice, Motivation, Cognitive Orientation, etc</li> </ul>
LIWC (Linguistic Inquiry and Word Count)	http://liwc.wpengine.com	<ul> <li>2300 words, &gt;70 classes</li> <li>Affective Processes – negative and positive emotion</li> <li>Cognitive Processes - Tentative and Inhibition</li> <li>Pronouns, Negation (no, never), Quantifiers (few, many)</li> </ul>
MPQA Subjectivity Cues Lexicon	https://mpqa.cs.pitt.edu/ lexicons/subj_lexicon	<ul> <li>6885 words from 8221 lemmas</li> <li>Each word annotated for intensity (strong, weak)</li> </ul>
SentiWordNet	http://sentiwordnet.isti.cnr.it	All WordNet synsets automatically annotated for degrees of positivity, negativity, and neutrality/objectiveness

# **Problem with this approach 1/2**



- A single word without context can be misleading
  - Consider the example usage of the word bad in IMDB movie reviews
  - There are 51778 reviews which had 10/10 score (top) which used the word bad



# **Problem with this approach 2/2**



- 1. They can't handle the 2 problems (subtlety and ordering effects) example given earlier
- 2. They do not agree with each other (using different library gives different polarity)

	Opinion Lexicon	General Inquirer	SentiWordNet	LIWC
MPQA	33/5402 (0.6%)	49/2867 <b>(2%)</b>	1127/4214 (27%)	12/363 (3%)
<b>Opinion Lexicon</b>		32/2411 <b>(1%)</b>	1004/3994 (25%)	9/403 (2%)
<b>General Inquirer</b>			520/2306 (23%)	1/204 (0.5%)
SentiWordNet				174/694 (25%)
LIWC				



# **Sentiment and markets**



## **Usage in markets**

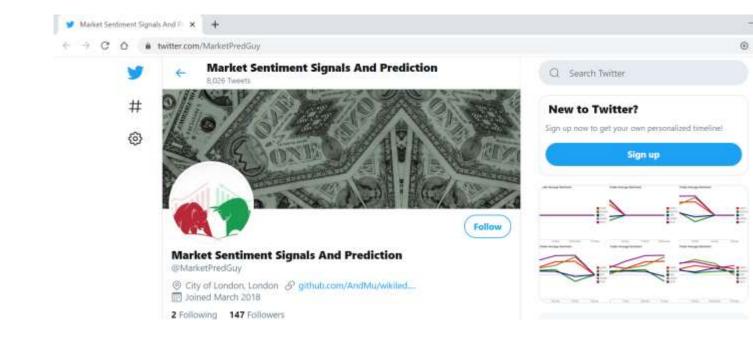
- Many firms use sentiment analysis to predict stock prices
- These sentiments go beyond social channels





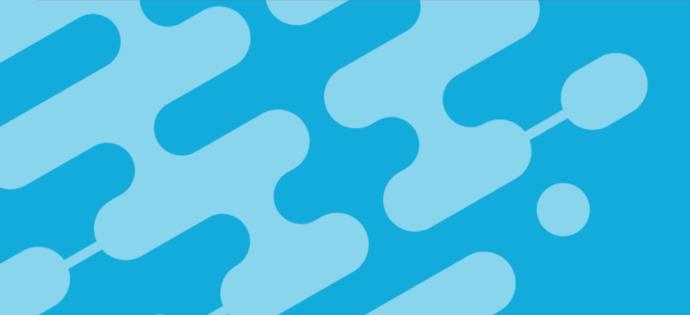
## Morgan Stanley used AI to study its own analysts and figured out how to beat the market

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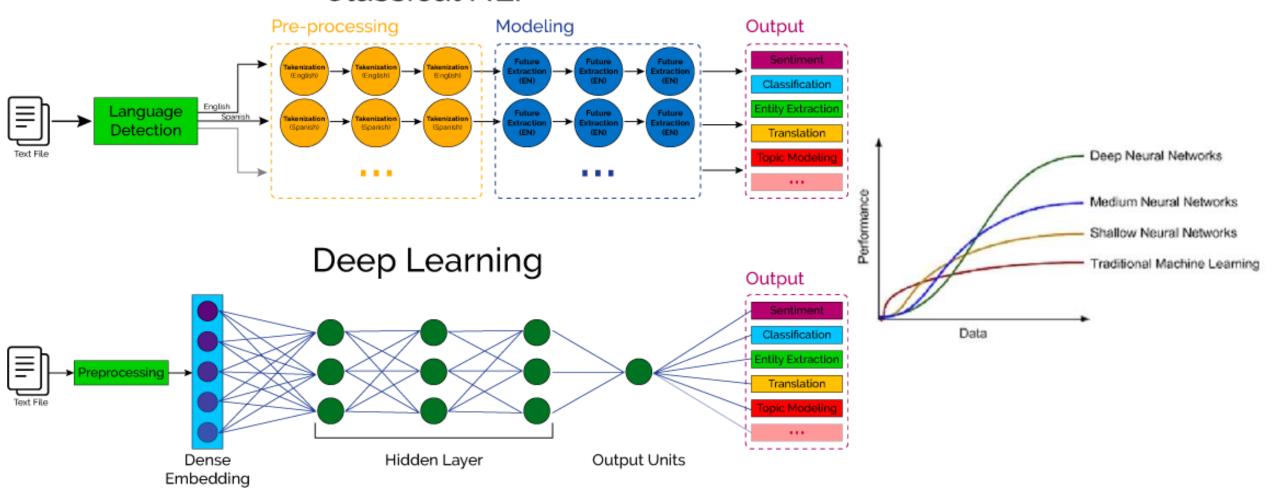
# **Our solution and offering**





## We use Deep Learning neural network models

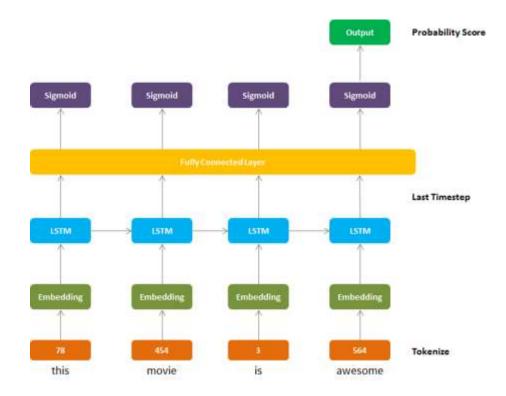
## Classical NLP



# Why this is superior?



- Since it has learned the sentiment of the input data (not a lookup for words), it is able to out perform all other approaches
- It is trained on local data so it performance is best on local usages and expressions. Not generic classification



Sample LSTM network for sentiment classification



# Demo



# **Our Offering and Value Proposition**



Deep Learning based Sentiment analysis

Simplifying People Journeys and Redefining their experiences with enterprises – Customer, Employees, Partners.

#### **Key features**

96.21% accuracy on IMDB dataset

Out of the box DL model

**Multiple-class sentiment detection** 

**Custom class levels** 

**Custom sentiment polarity** 

Local level language understanding

**Multi-lingual** 

**Custom Dashboards** 

# **Sentiment analytics Accelerator**

## **Value Proposition**

#### **Foundation for an Endless Possibility**

A robust foundation of Sentiment analytics AI will position your organization for host of use cases and value - be it superior customer experience, operations or marketing.

#### Superior experience, Boosting Sales

Unlock value in audio and/or text data to extract valuable features (like emotions, brand preferences) for superior experience be it customer, consumer, student, citizens....

#### **Scale through Industrialization**

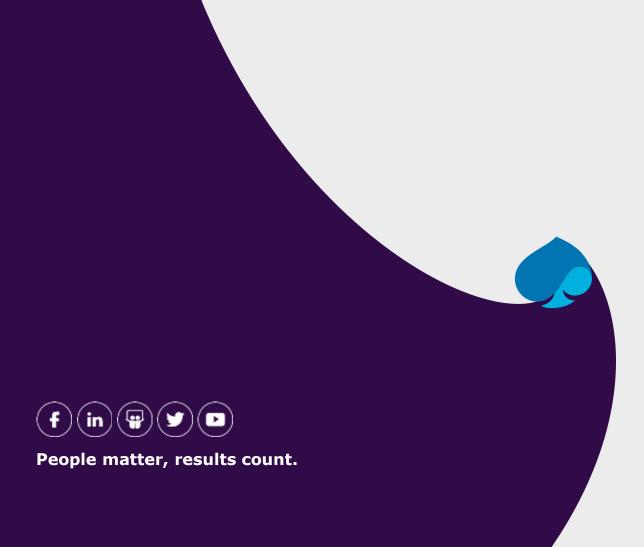
Our Sentiment analytics Accelerator provides tools to help manage the lifecycle of voice recognition and applied insights

#### **Augmented Talent and Workforce**

Augment wealth of human capital and experience for significant value – efficiency (automation) and /or additional capabilities (more work).







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## About Capgemini

A global leader in consulting, technology services and digital transformation, Capgemini is at the forefront of innovation to address the entire breadth of clients' opportunities in the evolving world of cloud, digital and platforms. Building on its strong 50-year heritage and deep industry-specific expertise, Capgemini enables organizations to realize their business ambitions through an array of services from strategy to operations. Capgemini is driven by the conviction that the business value of technology comes from and through people. It is a multicultural company of over 200,000 team members in more than 40 countries. The Group reported 2018 global revenues of EUR 13.2 billion.

Learn more about us at

www.capgemini.com