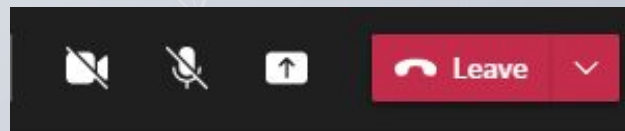
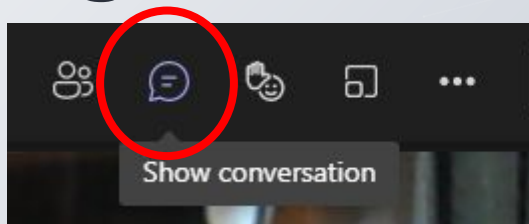


While we wait to get started ...

Open the chat



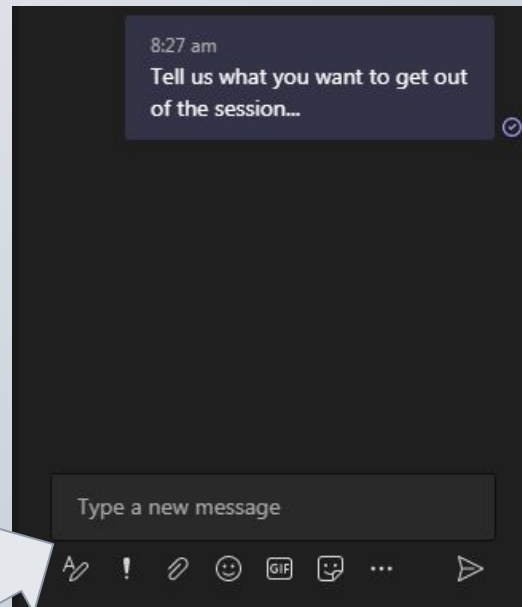
Your mic is on mute
... and camera disabled

Tell us what you want to
get out of the session.

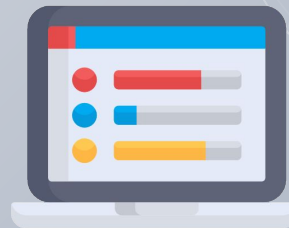
NOTE:

your name will appear
with your comment.

The chat won't be part
of the recorded version.



Take our poll ... you will
find it in the chat...



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Discovering **Artificial Intelligence (AI)**

Natural Language Processing for large text analysis



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Acknowledgement of Country



ESA acknowledges the Eastern Kulin Nation, Traditional Custodians of the land on which our head office stands, and pays our respects to Elders past and present.

We recognise the Traditional Custodians of Country across Australia and their continuing connection and contribution to lands, waters, communities and learning

By the end of this session

Discuss with students why **understanding language** is more than turning speech into text.

Observe / try a **hands-on example** of writing a Python program to rate sentiment of texts.

Access learning sequences to analyse **large texts**.

Achievement standards:

Achievement Standard

By the end of Year 6, students explain digital system components (hardware and how digital systems are connected) and how digital systems use data to represent a variety of data types.

Students define problems in terms of requirements and design solutions to address the problems. They incorporate repetition and user interface design to implement their digital solutions, and explain how information systems meet needs and consider sustainability in the creation and communication of ideas. They collaborate on digital projects using protocols.

Achievement Standard

By the end of Year 8, students distinguish types of networks and defined purposes. They explain how image and audio data can be represented in digital systems.

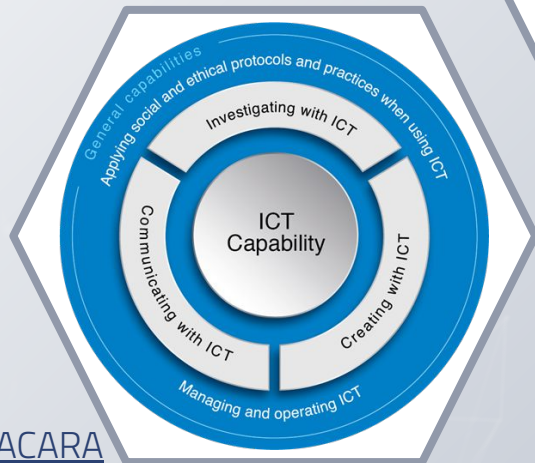
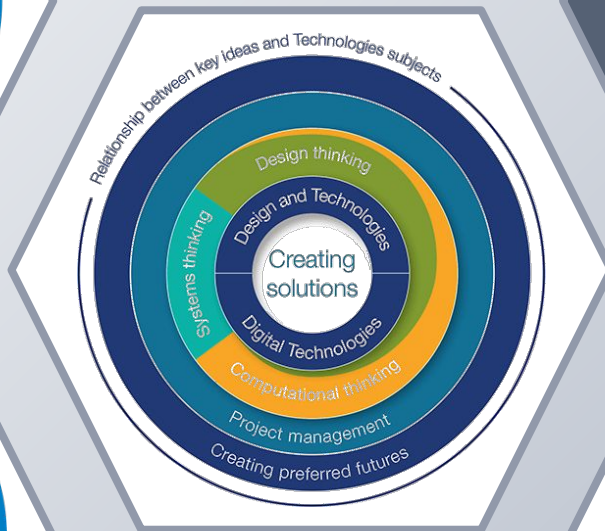
Students plan and manage digital projects to meet information needs. They define and decompose complex problems in terms of functional requirements and constraints. They design and implement modular programs, including an object-oriented program, using algorithms and data structures involving modular functions that reflect the relationships of real-world data and data entities. They take account of privacy and security requirements when selecting and validating data. Students test and predict results and implement digital solutions. They evaluate information systems and their solutions in terms of risk, sustainability and potential for innovation and enterprise. They share and collaborate online, establishing protocols for the use, transmission and maintenance of data and projects.

Achievement Standard

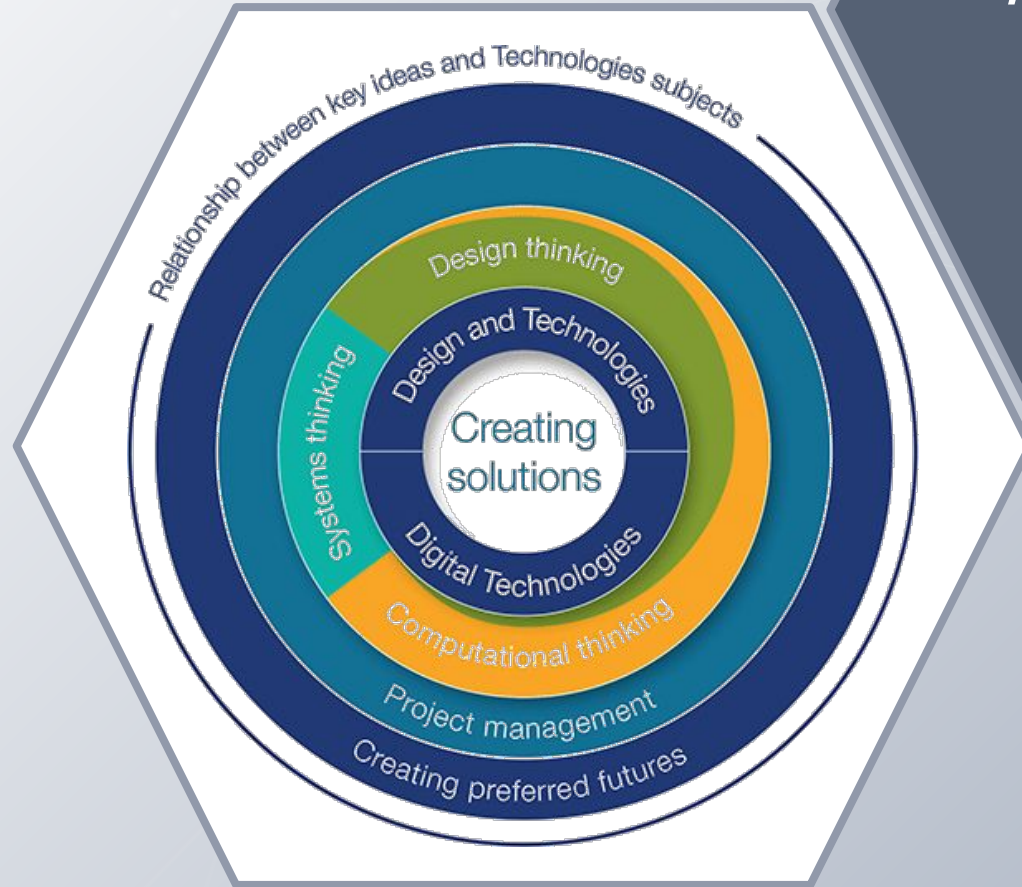
By the end of Year 10, students explain the control and management of networked digital systems and the security implications of the interaction between hardware, software and users. They explain simple data compression, and why content data are separated from presentation.

Students plan and manage digital projects using an iterative approach. They define and decompose complex problems in terms of functional and non-functional requirements. Students design and evaluate user experiences and algorithms. They design and implement modular programs, including an object-oriented program, using algorithms and data structures involving modular functions that reflect the relationships of real-world data and data entities. They take account of privacy and security requirements when selecting and validating data. Students test and predict results and implement digital solutions. They evaluate information systems and their solutions in terms of risk, sustainability and potential for innovation and enterprise. They share and collaborate online, establishing protocols for the use, transmission and maintenance of data and projects.

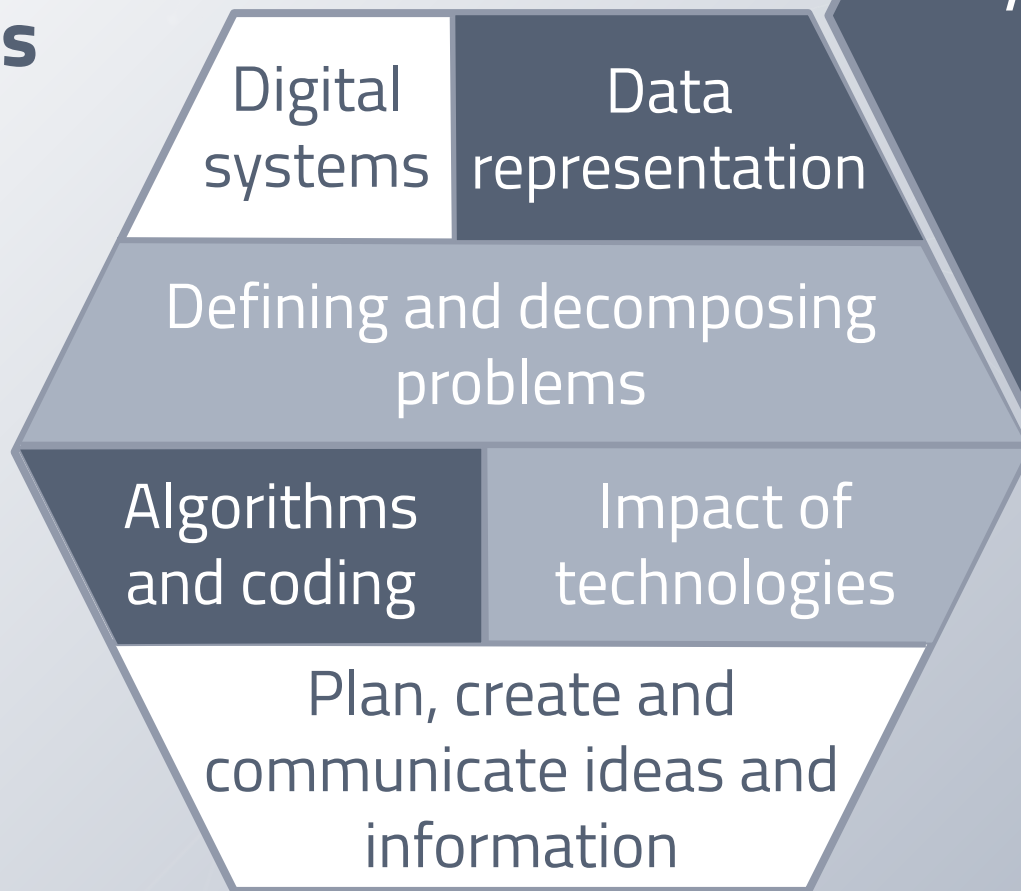
AI topics



AI topics



**Foci for this
deep dive:**



AI topics

Systems Thinking



Design Thinking

Computational Thinking



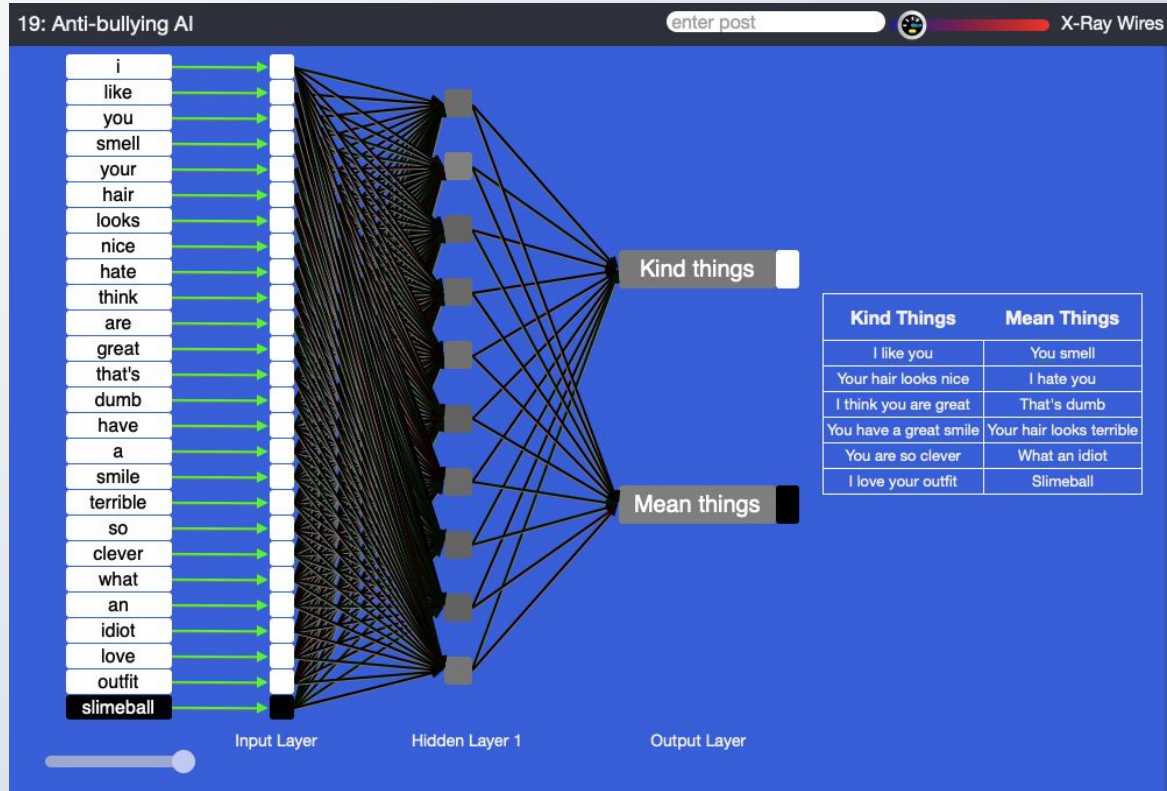
Natural Language Processing for large text analysis

How can AI help us
examine texts?

EXPLAINER VIDEO: [AI in our everyday life](#)



Anti-bullying AI visualisation



RESOURCE: Simulation at
[My Computer Brain](#)

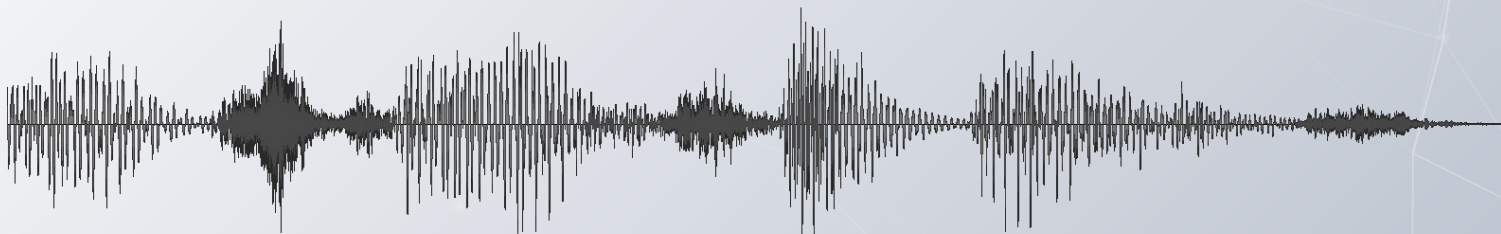
LESSON: [Anti-bullying AI](#)
(Years 5-8)



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Individual words is not enough

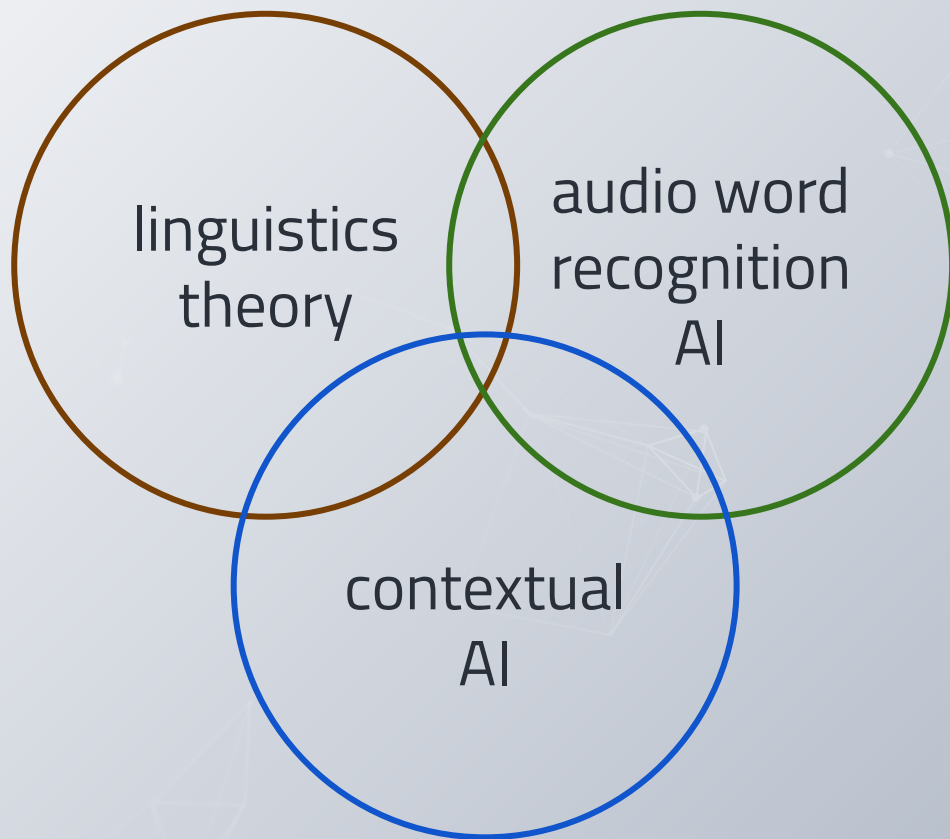
"Add chia seeds to my shopping list."



add	she	a	sees	to	my	shopping	list
app	chia	seeds	to	guy	stopping	Liste	
ad	Sia	seethes	2	hi	sopping	list	



It's a combination



and it's complex!

- Think about how Aussies use the word "ordinary".
- "Ken Behrens" = Canberrans

Today we're using Sentiment Analysis

- rate a sentence for **polarity (between -1 and 1)**:
 - How positive or negative is it?
- rate a sentence for **subjectivity (between 0 and 1)**:
 - How non-emotive or emotive is it?

LESSON: Coding a sentimental chatbot (Years 7-10)

Our hands-on example

A **star rating assigner** for restaurant reviews.

Five short reviews are provided.

Each one needs to be assigned a star rating between 1 and 5.

Our hands-on example

We'll code this with
**general purpose
programming.**

Using:

- Python
- **replit.com** online environment
- **TextBlob** library

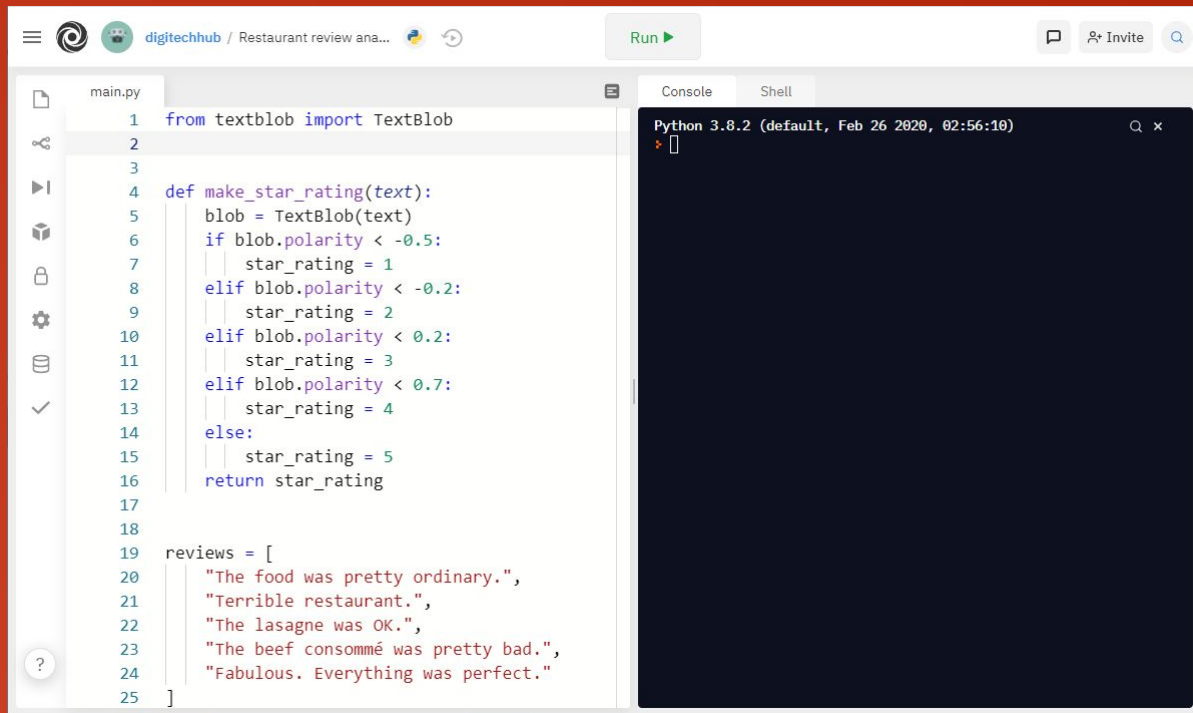
TextBlob and linguistic research

- Sentiment functionality relies on research by CLiPS (Computational Linguistics, Psycholinguistics and Sociolinguistics) research center, University of Antwerp.
- Hundreds of English adjectives and key nouns are assigned polarity and subjectivity values.
- Sentence structure also taken into account (eg. amplifiers like '**extremely**').

Design our algorithm

```
reviews = [ 'The food was pretty ordinary.', ... ]  
  
FOR EACH review IN reviews  
    polarity = GET POLARITY OF review  
    IF polarity < -0.7 THEN  
        star_rating = 1  
    ELSE IF polarity < -0.3 THEN  
        star_rating = 2  
    ELSE IF polarity > 0 THEN  
        star_rating = 3  
    ...  
    END IF  
    DISPLAY star_rating  
END FOR
```

Code our program



The screenshot shows the repl.it Python environment. The code editor on the left contains a Python script named `main.py` with the following code:

```
1 from textblob import TextBlob
2
3
4 def make_star_rating(text):
5     blob = TextBlob(text)
6     if blob.polarity < -0.5:
7         star_rating = 1
8     elif blob.polarity < -0.2:
9         star_rating = 2
10    elif blob.polarity < 0.2:
11        star_rating = 3
12    elif blob.polarity < 0.7:
13        star_rating = 4
14    else:
15        star_rating = 5
16    return star_rating
17
18
19 reviews = [
20     "The food was pretty ordinary.",
21     "Terrible restaurant.",
22     "The lasagne was OK.",
23     "The beef consommé was pretty bad.",
24     "Fabulous. Everything was perfect."
25 ]
```

The console on the right shows the Python 3.8.2 (default, Feb 26 2020, 02:56:10) environment with a prompt `>` and a cursor.

We're using the **repl.it** environment for Python coding.

- Starting point
- Finished program

What would you like to try?

Tinkering with the program

- Input is a text file with 1000s of reviews.
 - Process the whole file and provide summary statistics.
- Bring in a CSV with multiple reviews assigned to restaurants.
 - Get an average star rating for each restaurant.
 - Identify most common words used in reviews for each restaurant.

Search
restaurant
review
datasets
on Kaggle.

Other projects

- Analyse student reviews collected themselves with an online form.
 - Spreadsheets are not the only tool for data analysis.
 - **Automated quantitising:** Qualitative data converted to quantitative data to present in a chart, infographic.
- Automatic phone machine to detect an irate customer and direct the call to the manager. (This challenge is included in the **Sentimental Chatbot lesson idea.**)

Taking this further to look at texts

- Bring in a full text, eg. *Alice in Wonderland*
- Break it down into words, sentences and paragraphs:
 - remove punctuation
 - **tokenise** the text

LESSON: Book analysis with AI techniques (Years 7-10)

Taking this further to look at texts

- Use sentiment analysis:
 - examine polarity over the course of the book
 - find frequent pronouns to identify characters
 - classify characters as heroes and villains

```
Alice is a hero, score: 42
Queen is a hero, score: 16
Rabbit is neutral, score: 6
Duchess is a hero, score: 18
Illustration is neutral, score: 0
Hatter is a villain, score: -5
Majesty is a villain, score: -2
Alices is a hero, score: 11
Youre is neutral, score: 1
Hearts is neutral, score: 1
```

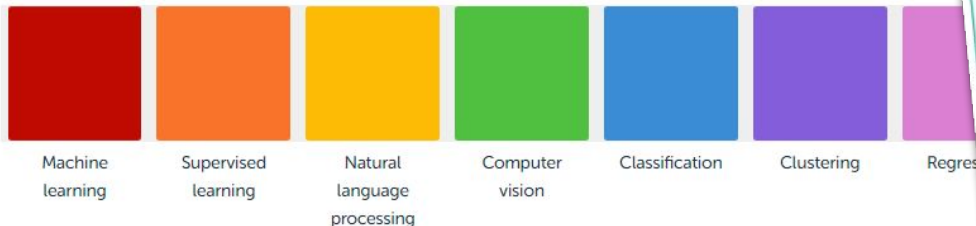
LESSON: Book analysis with AI techniques (Years 7-10)

Artificial Intelligence lesson plans

Humans display natural intelligence in contrast to machines that demonstrate artificial intelligence (AI).

AI has various definitions however for our purposes we are using the definition 'any device that perceives its environment and takes actions that maximize its chance of successfully achieving its goals' [1]. [Read more...](#)

The following lesson ideas cover a range of specialisations and subsets as indicated by the colour coding. Click on the coloured squares to learn more about each definition.



Lesson plans

Artificial Intelligence

[Access DT Hub AI lesson plans](#)



A chance to ask questions ...



Use the chat...

How can you incorporate these teaching ideas?

What do you feel more confident about?

What do you still need to know?

Next steps

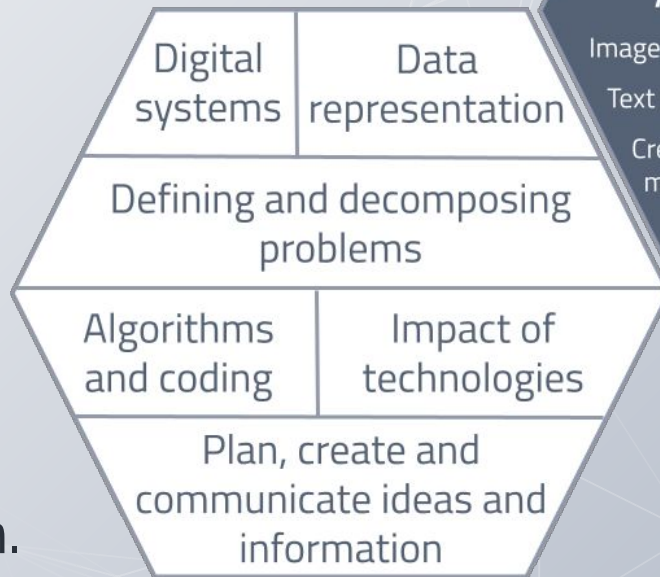
Making a commitment to implementing AI in your classroom

Use the chat to **write your idea** of where you will include AI as part of your teaching and learning program.

Connecting and sharing with the group.

email:

digitaltechnologieshub@esa.edu.au



AI topics

Image recognition

Text & speech recognition

Creating & using AI models (machine learning)

Bias and ethical issues



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Other Deep Dives

Deep dive 4: AI, ethics and systems thinking

Tues 7th Sept 2021