Team Winterfell

Kim Mackie Chapman
DOB: 26/12/1990
Age: 28
Location: Sydney (originally from Melbourne)
Height: 177cm (5'8)
Hobbies and interests: Learning Japanese and Spanish, amateur astonomy, history, reading, gym and technology.
Favourite TV series: Star Trek.
Favourite film genre: Historical Drama and Sci Fi.
Favourite book series: Lord of the Rings.
Interesting fact about myself: I did a year of high school exchange in the city of Nagoya, Japan. The friends I made from my exchange are still close friends today

Genevieve Dwyer
Student number: s3807717
S3807717@student.rmit.edu.au
Australian
Education
- Bachelor of Information Technology (currently studying)
- Certificate IV in Training and Assessment – 2007
- Bachelor of Taxation 1997 (incomplete)
- Certificate in Small Business Enterprise - 1996

Interesting fact/hobby
I did a tour of the Sydney Harbour Tunnel when it was being built in 1991 (yes, I'm that old).

Tim Rennick s3806967
tim.poddie@gmail.com
My name is Tim Rennick, I was born and raised in Victoria. My parents are both Australian; however my grandparents were Czech refugees, who fled to Australia after world war two. I am agnostic, but was educated at a private catholic school in Melbourne, before briefly attending Deakin University. After deferring at the end of the second semester, I opted to work fulltime instead. I started working in Superannuation in late 2017, and have been there since. In May of 2019 I decided to advance my education by studying a Bachelor of Business online with RMIT, while still working. I enjoy reading, playing games on computers and playing tennis. While growing up, I had a pet Miniature pig that lived in the house with us. His name was Christopher.

Sebastian Tipping: s3752148
s3752148@student.rmit.edu.au
I was born in Melbourne and have lived here all my life but have travelled around. I am European descent and only speak English.

I am working on finishing high school through Home Schooling by doing MathsTrack though Adelaide University: https://www.adelaide.edu.au/mathslearning/bridging/
I have also done 2 previous University courses which have been General Physics though Murdoch University and then Introduction to Programming though RIMT.
I have my own custom pc rig that I built a little over 2 years ago and love to play a variety of games.
I also have started playing dungeons and dragons lately and have really started to like it

Robert s3795095
s3795095@student.rmit.edu.au
I am originally from Melbourne and I moved up to Canberra about three years ago for work. I have a Master of Law and work as a Privacy Lawyer for a Government Department. I enjoy playing and watching sport such as Australian Rules Football and soccer.

Team profile:

Kim:

16 Personalites.com Personality Test
Here we can see that my personality outcome is the 'Advocate' or INFJ-T. What this means is that I am mostly introverted and direct most of my mental energy towards my intuitive understanding of a situation or problem more so than observing.
In addition to being less assertive in my interactions with other people. What this means for my behaviour when working in my team for the assignment is that I will most likely be the 'bond' of the group.

Political Compass Test
As we can see from my results, I fit into the 'left/libertarian' section of the political compass. I think that what this means for my interaction with my group, is again myself acting as the common bond or the 'diplomat' As my personal and political views are overall accepting of others and I believe this is what will enable me to both co-ordinate work tasks with my team members and mediate as well.

Game of Thrones House Quiz
This one was just for a bit of fun, however it is still relevant to my profile
As we can see from the result, I was placed in House Stark. I feel that this is apt as my parents are both from the UK, from Northern England and Scotland to be exact. I've always felt close to my northern English/Scottish heritage. The culture and history of the Stark's and the North in Games of Thrones was largely based on the northern parts of the UK in real life. How this relates to my co-operation with my group is that I do often times use a lot of parlance and colloquialisms from the region in my speech, I need to be wary that these aren't widely understand and should stick

to a more 'standardised English' when communicating with members of my group and when creating input and text for the assignments.

Genevieve

Jung and Myers Human metrics Typology Test
http://www.humanmetrics.com/cgi-win/jtypes2.asp
ENFJ
Extraverted iNtuitive Feeling Judging
ENFJs are the benevolent 'pedagogues' of humanity. They have tremendous charisma by which many are drawn into their nurturant tutelage and/or grand schemes. Many ENFJs have tremendous power to manipulate others with their phenomenal interpersonal skills and unique salesmanship. But it's usually not meant as manipulation -- ENFJs generally believe in their dreams, and see themselves as helpers and enablers, which they usually are.

How to study – Learning style-assessment
https://www.how-to-study.com/learning-style-assessment/
According to this test I am a visual learner and learn best when information is presented in a written language format or in another visual format such as pictures or diagrams.

Margerison-McCann Team Management - Team Role test
https://www.123test.com/team-roles-test/
I actually did this assessment at work which identifies my major and related role preferences on the Margerison-McCann Team Management Wheel. It had some interesting insights and it was also interesting to look at where other team members were situated on the wheel.

Tim

What do the results of the test mean to you?
While some of these test results are surprising, for the most part they mainly reinforce what I already knew about myself. I have always been more of an introvert, and in most large social situations have sought to isolate myself.

The Myer-Briggs test I felt was particularly accurate in that it defined many of my personality traits and creative style. In This test I was ranked as an INFJ -T. The test's explanation of me as an advocate and Diplomat also helped me understand more about myself and some of the things I have thought but struggled to word in the past. Particularly, in that while I try my best to help others, I can also be sensitive to others criticisms and thought, and too idealistic. The Myer-Briggs test also classified me as easy to burn out, and always looking for a cause. These weaknesses identified

by the test resonated with me. In the past I have often avoided or put off routine duties to focus fully on what I consider are concrete steps towards my goal. This has led me on multiple occasions to burn out and give up on something I had been trying to perfect.
The online learning test was the biggest surprise for me. I have never considered my preferred style of learning, but before taking this test I would have guessed auditory. I often enjoy listening to books and podcasts, rather than reading or watching lectures. However the test classed me quite strongly as visual. I am not sure if I fully agree with this assessment but will seek to identify my best learning strategies in the future with experience.
The creativity test showed the most expected results, ranking me above average in creativity. I have often been told growing up that I was quite creative, and this test confirmed those comments. However, it was interesting to explore the sub categories of creativity and where most people and myself ranked.

Sebastian

Myers-Briggs test
Personality: Architect
INTJ-T

When I have an idea I can just keep working on it and will likely achieve my goal. I should try to find a team which is motivated and passionate about the work or goal that we are trying to achieve.

Learning style test
Scores:
Auditory: 60%
Visual: 20%
Tactile: 20%

I should find at least one person who can work out by seeing or doing what needs doing then explain that to me in words or the other way around if we are going to get verbally told what needs doing I can then explain to other people visually.

Big Five
Openness 73%
Conscientiousness 60%
Extraversion 29%
Agreeableness 71%
Neuroticism 67%

I am quite open and inquisitive and can think outside the box.
I can be quite agreeable and put other people ahead of myself and can help and co-

operate
I can look for team members that might struggle with something and help them to learn through a smaller team would be good because then it will be quieter and I will be more comfortable.

Rob

Results of the Myer-Briggs test:
personality type is: Consul
76% extraverted
61% observant
61% feeling
61% tactics
53% assertive

Results of the Learning styles test:
•Kinesthetic 69
•Visual 51
•Auditory 49

•Results of the TypeFinder Personality test
63% extraverted
•51% intuition
•55% feeling
•60% judging
•Personality code types: ‘The Teacher’ and ‘The Provider’

Ideal Jobs

Kim

My ideal job in IT would be working within the field in the space industry, for Space Ex, the job for my ideal position is as a senior software engineer for SpaceX, developing the software for their launch systems.

Genevieve

Information Policy Lead

In this role they are looking for an experienced policy development professional with information and data management knowledge or experience to be part of a small team.

Tim

Complaints Manager
This position involves handling a large number of complaints that have been escalated beyond the contact centres in which they started. The successful applicant would need to investigate complex cases within a large organisation, often spanning across multiple divisions or departments. They would also have to correspond with the complainants to reach a positive resolution, while also working to adhere to financial and business rules and regulations. Additionally, they would affect long term change by identifying and seeking to change business practises to reduce dissatisfaction in the future.

Sebastian

My ideal job is CyberSecurity
This position includes leading a small team, planning and executing attacks attempting to breach the system.

Rob

Cyber Security Consultant
A Cyber Security Consultant is an advisor and guide. A consultant, will be able to design and implement the best security solutions for an organisation, company or government agency needs. They interact with stakeholders, draw up budgets, supervise teams, and research. They conduct security tests and probe for vulnerabilities. They have good technical and interpersonal skills. I am drawn by the position's mix of requiring technical knowledge as well as leadership and negotiation skills. I am also drawn in dealing with people such as experts and clients to develop the best solution to the secure the data

Tools

Websites:

Kim

https://github.com/Sakuramachi/My-Programs/blob/master/Assessment%201%20-%20Kim%20Chapman

Genevieve

https://sway.office.com/95J6PEHbirhDgDnL?ref=Link&loc=play

Tim
https://poddie62.github.io/RMIT/

Sebastian
https://sebastian-tipping.github.io/cpt110-Assignment1/

Rob
https://robzyg.github.io/Assignment1/

Group Repo
https://github.com/RobZyg/Assignment-2

Industry Data

Cybersecurity

Cybersecurity is the protection of computer systems from the theft of or damage to their hardware, software, or electronic data, as well as from the disruption or misdirection of the services they provide. Cybersecurity is becoming a larger issue as there is increased reliance on computer systems, the internet, wireless communication such as Wi-Fi and Bluetooth and the increasing use of the internet of things devices. The increasing reliance of these technologies means that there is an increasing number of systems and therefore more potential areas of vulnerabilities (Itgovernance.co.uk, n.d.).

The most common tactic for network protection is a firewall. Firewalls can exist either as a software tool or a hardware device that is physically connected to the network (Oaic.gov.au, n.d.).

Where an intruder has managed to circumvent the firewall and network security, the next element to the defence of the system is the antivirus tools which are designed to scan hardware for malicious code. The aim is to, at worst, quarantine the malicious code and, at best, remove it before it can spread (Oaic.gov.au, n.d.).

Backup management is also an important piece of defending against cyberattacks. Backups allow organisations or individuals to mitigate risks with ransomware or other malicious code which may destroy data or software. Backups allow for the ability to recover quickly from an outage or data breach (Oaic.gov.au, n.d.).

Training is possibly the most value defence against cyberattacks. The most successful organisations protecting themselves from cyberattacks are usually those who run regular sessions on how staff can mitigate risks to their systems (Cyber.gov.au, n.d.).

Common areas where cybersecurity is prevalent:

1. **Financial systems**

Financial systems are seen as an ideal target for hackers as the possible financial return for being able to compromise a system makes it an enticing target. There are many ways to compromise financial systems, ranging from access personal customer data to create identity fraud, to actually transferring funds or using stolen credit card details to gain a direct financial benefit. There are also attacks designed to disrupt the services of financial institutions such as denial of service attacks. Financial institutions have been continuously developing ways to counter the attacks. This includes a wide range of measures such as two-step authentication for online transactions, being able to instantly pause stolen credit cards and detecting unusual transactions and notifying customers via email or SMS text messaging that an unusual transaction has occurred. (Lin, 2017)

2. Utilities and industrial equipment

Computers control functions at many utilities, including coordination of telecommunications, the power grid, and valve opening and closing in water and gas networks. Cyberattacks can disrupt essential services which depending on the length of time they are out, can be catastrophic (Zetter et al., 2016).

3. Consumer devices

Desktop computers and laptops are commonly targeted to gather passwords or financial account information, or to construct a botnet to attack another target. Smartphones, tablet computers, smart watches, and other mobile devices such as quantified self devices like activity trackers have sensors such as cameras, microphones and may collect personal information. (Shahani, 2014)

4. Businesses

Businesses are common targets as they can hold financial and personal data. Sometimes the data breaches can give hackers a large windfall for example Home Depot (Backman, 2014) and Target Corporation (Staff, 2013) in the United States of America having millions of customers' credit card details breached. Furthermore, some cyberattacks are ordered foreign governments with the intent to spread their propaganda, sabotage targets.

Not all attacks are financially motivated however; for example in the Sony Pictures attack of 2014 the motive appears to have been to embarrass with data leaks, and cripple the company by wiping workstations and servers (Pagliery, 2014).

5. Government

Government and military computer systems are commonly attacked by activists and foreign powers. Local and regional government infrastructure such as traffic light controls, police and intelligence agency communications, personnel records, student records and financial systems are also potential targets as they are now all largely computerised (BBC News, 2012). Passports and government ID cards that control

access to facilities which use RFID can be vulnerable to cloning (Liptak, Sciutto and Schleifer, 2015).

6. Internet of things and physical vulnerabilities

The internet of things provides opportunities for misuse as the downside to creating more ease of use and connectivity. In particular, as the internet of things spreads widely, cyberattacks are likely to become an increasingly physical rather than a virtual threat. If a front door's lock is connected to the Internet, and can be locked/unlocked from a phone, then a criminal could enter the home at the press of a button from a stolen or hacked phone. People could stand to lose much more than their credit card numbers in a world controlled by internet of things devices (Vermesan and Friess, 2013).

Currently most cybersecurity tools require human interaction or configuration. As an example, an IT team has to set up the antivirus system and backup schedules for an organisation and ensure that they are maintained. Artificial intelligence is expected to grow in the cybersecurity space (Secureworks.com, 2017).

In the future, we should be able to rely on smart tools to handle the bulk of event monitoring and incident response. The next generation of firewalls should have machine learning technology built into them, allowing the software to recognise patterns in web requests and automatically block those that could be a threat (Bocetta, 2019).

It is expected that the natural language capabilities of Artificial Intelligence will be the future of cybersecurity tools. The theory is that by scanning large portions of data across the internet, Artificial Intelligence systems can learn how cyberattacks originate and suggest solutions for decision makers within the organization (Bocetta, 2019).

The downside of artificial intelligence is that it will not be cheap and it is likely that only large organisations will be the only ones who are capable of affording the first generation of security products.

Currently, the most common way for verification to access a system or identify an authorised user is via passwords. Internet users create passwords for each website or service that they subscribe to online. This system can be frustrating to maintain as well as vulnerable to attack if they rely on simple passwords or use the same one for multiple sites. (Espinosa, 2018) There have been improvements in password manager software performance in recent years, most of which aim to simplify and strengthen online security by removing a large portion of the manual effort from the task through algorithms that suggest and store passwords complex enough to reduce your chances of being hacked (Bocetta, 2019).

However, developments in Artificial Intelligence could mean that passwords become a thing of the past. The idea is that the Artificial Intelligence would track every user within an organisation based on roles, privileges, and common actions. Any deviation from the norm would be flagged and require the person to use a second form of authentication, such as biometrics that scan fingerprints or facial features. This

process could also of second form authentication could also extend to individuals accessing the internet and may make passwords a thing of the past (Bocetta, 2019).

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Machine learning

Although most agree Machine learning is a branch of Artificial Intelligence, definitions and explanations of machine learning vary, including:

> *Machine learning is an application of artificial intelligence (AI) that provides systems the ability to automatically learn and improve from experience without being explicitly programmed. Machine learning focuses on the development of computer programs that can access data and use it learn for themselves*. (Expert system 2019), and

> *Machine learning is a method of data analysis that automates analytical model building. It is a branch of artificial intelligence based on the idea that systems can learn from data, identify patterns and make decisions with minimal human intervention.* (SAS 2019)

But what does learn mean for computers, is it the same as learning for humans? The Macquarie Dictionary defines learning as:

> *Learning is to acquire knowledge of or skill in by study, instruction or experience (Macquarie 2010)*

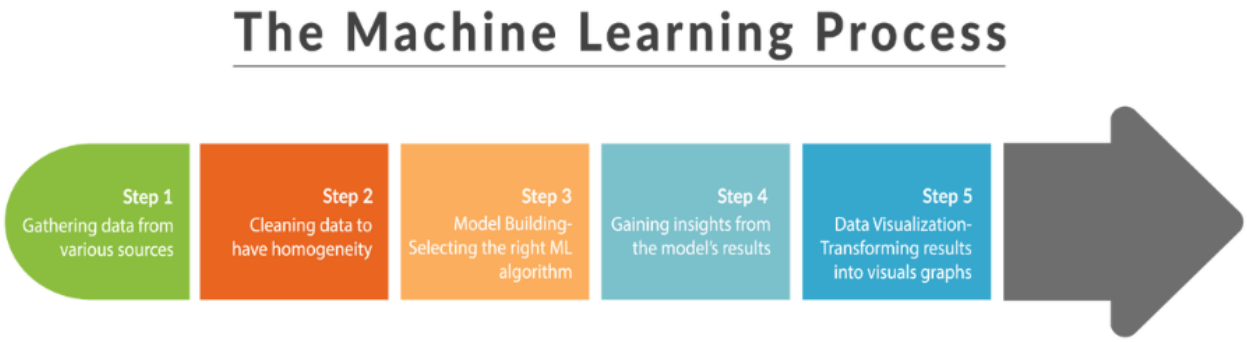
Is this what it means for computers? How would we know when a computer has knowledge or a skill? Afterall, you can receive instruction without benefiting from it at all if it can't be applied. It seems that learning in this context is more linked to performance and ability to apply learnings rather than building knowledge (Witten 2017).

This learning occurs by using algorithms and statistical models in order to perform a specific task effectively without using explicit instructions, relying on patterns and inference instead. (Wikipedia 2019) These algorithms build mathematical models using sample data, known as training data, and they are able to adapt without being specifically programmed to do the task (Wikipedia 2019). They learn from previous computations to produce reliable, repeatable decisions and results. (SAS 2019)

This sample data needs to include robust, inclusive samples, otherwise outputs can contain bias that can lead to misleading information that may advantage or disadvantage. Datasets used to train AI systems must be appropriate for the system they are used to train (Dawson - CSIRO 2019). Data use must be ethical and useful and must not allow unfair bias, breaches to privacy or security and be of sufficient quality and relevance for input into algorithms (Dawson - CSIRO 2019). If the data that is input is not appropriate, then the outputs will not be reliable.

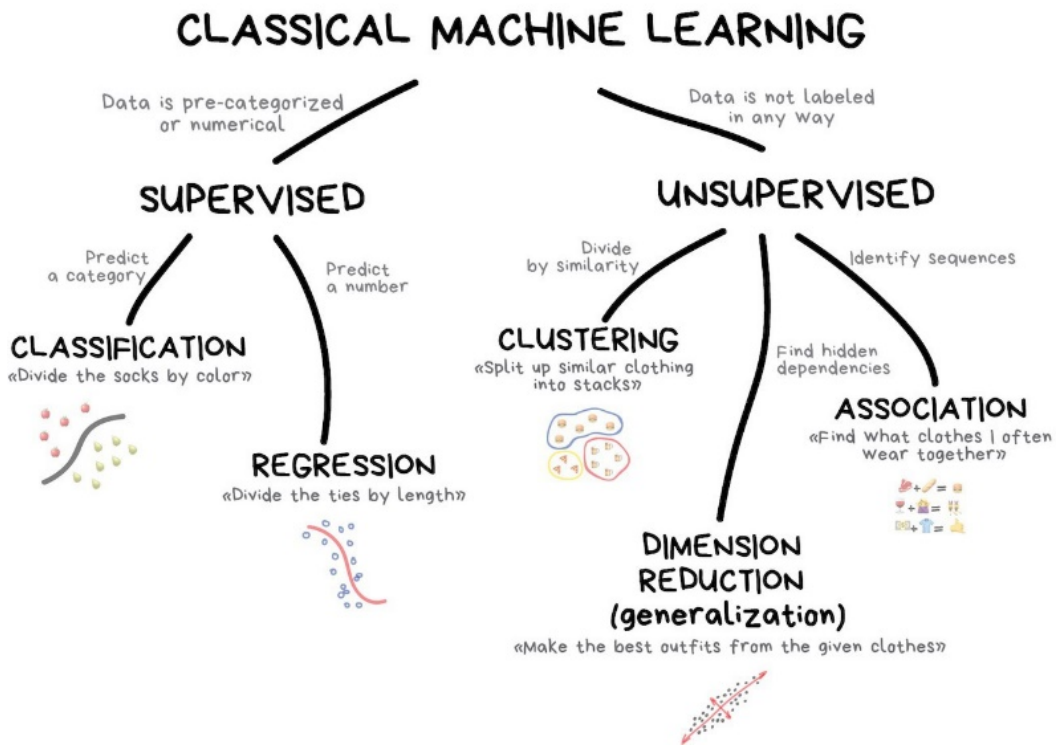
The Machine Learning Process

The following are the steps common to most machine learning based projects:



Python tips, *Introduction to Machine Learning and its Usage in Remote Sensing*, https://pythontips.com/2017/11/11/introduction-to-machine-learning-and-its-usage-in-remote-sensing/ viewed 7/7/2019

As illustrated above, the first two steps are about gathering the data and cleansing it to ensure that it is complete, accurate, consistent and unique. This data is then used to build the model to select the right algorithm in the step 3, that will then be used in step 4 to gain insights which can be done in a number of ways. Two of the most widely adopted machine learning methods are **supervised learning** and **unsupervised learning,** but there are other types such as **semi-supervised** and **reinforcement learning** which I will also examine (SAS 2019).



VAS3K, 2019, *Machine Learning for everyone*, https://vas3k.com/blog/machine_learning/

Supervised learning algorithms are trained using labelled examples, such as an input where the desired output is known. (SAS 2019) As the example above illustrates using clothes. The clothes are sorted using a decision tree based on attributes known before ie socks labelled by colour - is it green or red, and ties by length – long or short. Often used for diagnostics, medicine and finance where historical data predicts future events (Vas3k 2019). Using methods like classification and regression, supervised learning uses patterns to predict the values of the label, that can then be used on additional unlabelled data, (SAS 2019) also known as data mining.

Unsupervised learning is used against data that has no historical labels (SAS 2019). Following on with the example above, the clothing is not labelled at all, so you're dividing up socks when you don't know what colours you have (VAS3K 2019). The goal is to explore the data and find some groupings or structure within it (SAS 2019). It works well for grouping data with similar attributes or identifying the main attributes that differentiate data, such as in marketing campaigns.

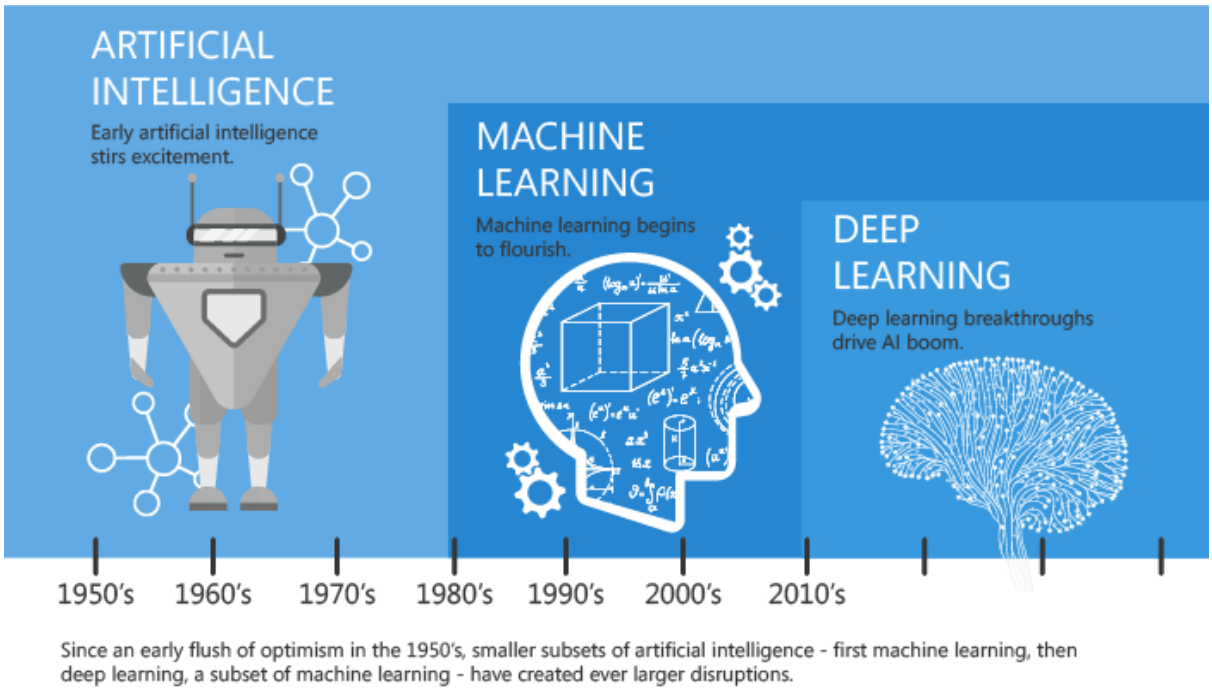
Semi-supervised learning is used for the same applications as supervised learning. But it uses both labelled and unlabelled data for training, typically a small amount of labelled data with a large amount of unlabelled data. This type of learning can be

used with methods such as classification, regression and prediction. Semi-supervised learning is useful when the cost associated with labelling is too high to allow for a fully labelled training process. Early examples of this include identifying a person's face on a web cam (SAS 2019).

Reinforcement learning is not related to assessing a data set or sets, it is carried out by processing the deluge of data from an environment, like those encountered by autonomous cars (VAS3K 2019). Using reinforcement learning, the algorithm discovers through trial and error what actions produce the greatest rewards (SAS 2019). The goal is to minimise the error rate, accidents or injuries in the autonomous car example, not predict everything (VAS3K 2019). This type of learning has three primary components, the agent (the learner or decision maker), the environment (everything the agent interacts with), and actions (what the agent can do). The objective is for the agent to choose actions that maximize the expected reward over a given amount of time (SAS 2019).

Machine learning over time

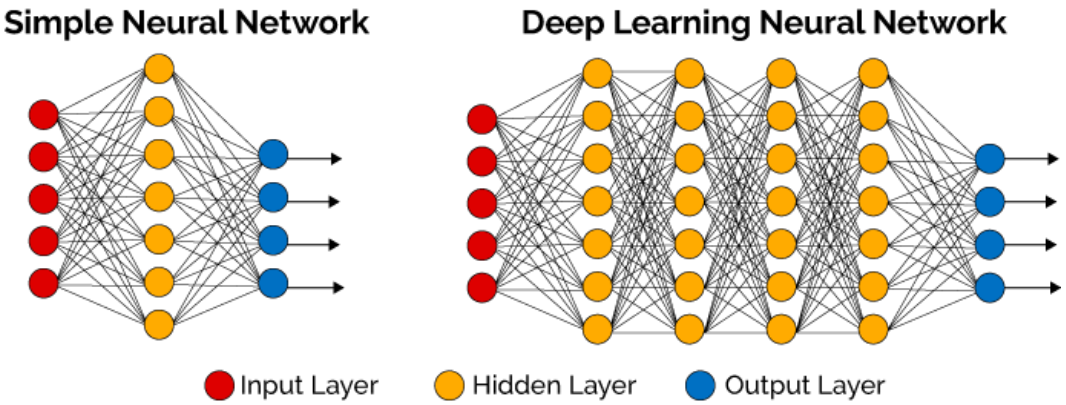
As you can see this has been around since the 1980s so what is behind the lastest surge in popularity? New computing technologies are transforming machine learning so it is not like machine learning of the past.



The evolution of artificial intelligence, machine learning, and deep learning. (Image source: Tandon 2016)

Deep learning is a subset of machine learning where artificial neural networks, algorithms inspired by the human brain, learn from large amounts of data. (Marr 2018). Deep learning combines advances in computing power and special types of neural networks to learn complicated patterns in large amounts of data (SAS 2019).

Neural networks are computing systems with interconnected nodes (illustrated by red and blue input and output points below) that work much like neurons in the human brain (SAS 2019). A Neural network is made up of a number of interconnected nodes and hidden layers. A hidden layer is any layer between the input layer and output layer and there can be multiple hidden layers (Zhou 2019). Using algorithms, neural networks can recognise hidden patterns and correlations in raw data, cluster and classify it, and, over time, continuously learn and improve. (SAS 2019)



Favio Vazquez, 22 December 2017, Deep Learning made easy with Deep Cognition in Becoming Human: Artificial Intelligence Magazine viewed 10 July 2019

These are being used for virtual assistants like Alexa or Siri or Cortana, translations, autonomous cars, chatbots, facial recognition, personalised marketing and medical diagnosis, the list goes on (Marr 2019). Amazon used deep learning to train its software to analyse medical records. And according to Taha Kass-Hout, *the software performed as well as or better than similar programs. It was also able to pull out data regarding patients' illnesses, prescriptions, lab orders and procedures, all of which is organized into a spreadsheet-like report.* (Locklear - Engadget 2018). This work is currently done by around 60 people, so this advance has the potential to replace them in pulling data from approximately 500,000 patient records.

The potential applications seem limitless as deep learning algorithms continue to perform better as they gain more experience, however, it is good to keep in mind that ethical principles should be followed when developing and using them. These should

include ensuring benefits are greater than costs, they cause no harm or disadvantage, they're legal, protect privacy, transparent, contestable and creators are accountable for impacts of algorithms.

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Natural language processing

Natural language refers to the way we, communicate with each other through speech and text. (Brownlee 2017). While the processing of natural language, Natural Language Processing (NLP), is not a new science, the technology is rapidly advancing thanks to an increased interest in human-to-machine communications, plus an availability of big data, powerful computing and enhanced algorithms. (SAS 2019)

Moore, an AI and Language Analytics Strategist, SAS describes Natural language processing as:

> ***… a branch of artificial intelligence (AI) that helps computers understand, interpret and manipulate human language. In general terms, NLP tasks break down language into shorter, elemental pieces, and tries to understand relationships among those pieces to explore how they work together to create meaning. The combination of NLP, machine learning and human subject matter expertise holds the potential to revolutionize how we approach new and existing problems (Moore 2019).***

Given the volume and importance of this type of data, we must have ways to understand and harness the value of natural language, as we do for other types of data. (Brownlee 2019).

But Natural Language Processing is difficult because of the:

- complexity of representing, learning, and using
- ambiguity in meaning
- interpretation needs real world experience, common sense, and contextual knowledge. (Shahriari 2019)

As the example below illustrates, depending on how the language is broken down into smaller pieces can dramatically affect the processing of its meaning:

Shahriari, A, viewed 11 July 2019, *Natural Language Processing in practice: Facts and fiction*, https://www.slideshare.net/Chief_Data_Officer_Forum/cdao-public-sector-2019-arash-shahriari-department-of-education-and-training?

Computational modelling of human language requires an understanding of:

- Morphology: structure of words
- Syntax: the way words are used to form phrases
- Semantics: construction of meaning by syntax
- Discourse: meaning in context (Shahriari 2019), and
- a general knowledge about the world.

Acquiring and encoding this knowledge is one of the fundamental impediments to developing effective and robust language systems (Ritkov 2005).

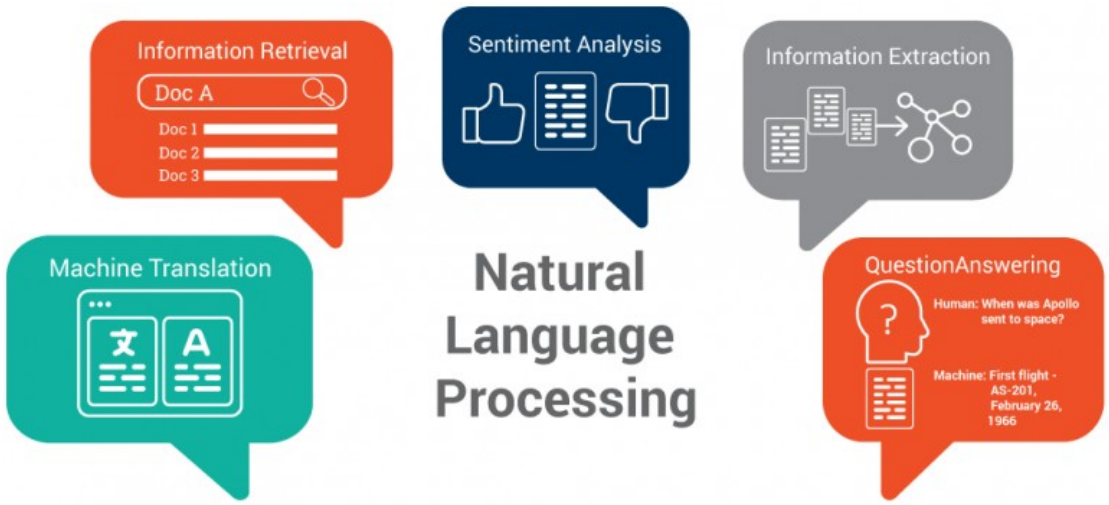
Moore explains that to be able to make sense of all this information requires a combination of three capabilities:

- *Natural language processing - Performs linguistic analysis that essentially helps a machine read text. It analyzes and converts text into form representations for text processing and understanding. This includes methods such as tokenization, part of speech tagging, stemming, named entity recognition and more.*

- *Machine learning - Once NLP has been applied to text, machine learning uses the output for data mining and machine learning algorithms to automate the generation of key insights and descriptive analytics.*

- *Human input - When it comes to analyzing text, human input is still incredibly important. Subject matter expertise is applied in the form of linguistic rules to help the machine capture slang, detect sarcasm and provide relevant context.*

The technology retrieves information to analyse unstructured text, then actively learns from the data through sentiment analysis and machine translation along with human direction to generate new insights. The purpose of this is to build and deploy text analytics models that enable understanding through topic detection, contextual extraction, document categorisation and sentiment analysis (SAS 2019).



Ontotext, 2017, Top 5 Semantic Technology Trends to Look for in 2017, viewed 13 July 2019, https://www.ontotext.com/top-5-semantic-technology-trends-2017/

NLP and Deep Learning

As illustrated in Shahriari's example above, machine learning algorithms traditionally use well defined fixed-length inputs and outputs. But they cannot work with raw text directly; the text must be converted into numbers (specifically, vectors of numbers). This is called feature extraction or feature encoding, and this is one of the key areas where deep learning is challenging statistical methods with singular and simpler models. For this reason new methods are starting to outperform traditional statistical methods (Brownlee 2019).

The following are three examples of what deep learning is capable of in the in the field of natural language processing: (Brownlee 2019)

Automatic Image Caption Generation - is the task where, given a photograph, the system must generate a caption that describes the contents of the image.

Automatic Translation of Text - is the task where you are given sentences of text in one language and must translate them into text in another language.

Automatic Text Classification - is the task of assigning a class label given a text document such as a review, tweet, or email. (Brownlee 2019)

From these examples you can see that developing systems capable of these tasks would be valuable in a broad range of domains and industries. (Brownlee 2019)

Chatbots

Chatbots use deep learning capabilities to automate user interactions with websites and social media sites. They are designed to interact or converse with users either via text input or verbal conversation (Hubspot 2019). They aim to seamlessly create a fully online interaction, that is available anytime.

Sometimes though, users have unrealistic expectations of chatbots and expect that they will converse in the same way as another human would. While this is a goal, it is not possible to do this yet using current technology (Botpress 2019).

An example of how this technology can still go wrong was Tay the Twitter chatbot, which was developed by Microsoft. Tay learned how to communicate with Twitter users to better understand how AI interacts with users. However, Tay only lasted 24 hours before being taken offline. As the inputs from users contained abusive content, Tay learned and created responses that were offensive, sexist and racist. The data being input was not appropriate, parameters were not sufficiently developed to filter these out, therefore outputs were not appropriate. (Dawson - CSIRO 2019).

Other applications

As NLP can be applied to any situation that needs rapid analysis of unstructured data, the applications are incredibly diverse. This has amazing potential to identify and categorise the overwhelming amount of data currently stored in uncontrolled environments, as the volume variety and velocity of growth mean that this is no longer possible for humans to do.

Intelligently analysed data is a valuable resource as it can lead to new insights, better decisions making and in commercial settings, competitive advantages. Conversely, not understanding data holdings could compromise service standards, increase exposure you to reputational damage, loss of data, high discovery, litigation and management costs throughout its lifecycle. Although it is difficult to quantify the full cost of managing this data throughout its lifecycle, we can all relate to the pace of growth qualitatively, and the exponential growing risks.

Looking ahead

Future developments in NLP are occurring in the subfield of Natural language understanding (NLU). Its potential in cognitive and AI applications go beyond the structural understanding of language to interpret intent, resolve context and word ambiguity, and even generate well-formed human language on its own. These developments have a number of important implications but will first have to address the complex problem of semantic interpretation, to understand the meaning and subtleties of human language in many contexts (SAS 2019).

Inexpensive storage has made it too easy to postpone decisions about what to do with data. Simply getting more memory and keep everything has been the solution for far too long but lying hidden in all this data is information, potential useful information, that we rarely make explicit or take advantage of (Witten 2017). The need to address the growing volume and variety of unstructured data, more than ever, relies on Natural Language processing and Machine learning in order to manage it and harness its full potential (SAS 2019).

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IT Work

Interviewing: Technical Lead for large technology company focusing on creating online platforms for other companies.

Questions

1. **Please tell us about your IT work. What exactly do you do?**

The company I work for is the largest independently owned company in Australia for website and online development. We offer a range of services such as mobile apps, but our main focus is website design.

My official role is Technical Lead, this means that I direct and manage a small team of people who work to launch and manage websites for large companies. As lead I have to manage and direct my team in their coding, while also overseeing their job performance and generally acting as a manager.

Another large part of my job is working with other teams within the business such as design and development. Often my I have to use my experience in projects to make recommendations and decisions about what software to use. After choosing a strategy and software to run with, I have to develop a plan within our team about who will do what. After assigning work and delegating tasks, I oversee the development of the project within the team.

2. Please tell us about the industry you work in.

The IT industry is very large, and depending on what area youre looking at it can range from very small independent companies to multinational giants. My company employs around 100 people, and our main competitor is Deloitte. Deloitte is obviously a very large company that specialises in many IT areas, whereas we focus primarily on website design.

The industry overall is quite competitive as more and more companies seek to establish themselves online in different ways. Previously I have worked for a very small companies with around 10 -15 people in them, who essentially did the same job but for smaller projects. Because of the competitiveness though there is also a lot of opportunity to expand your skills and move into better roles.

3. What other kinds of work do you have to do?

Apart from the management of my team, I also help spend a lot of time coding myself. Out of a 5 days working week, around 3-4 of those days I would spend writing or adapting code.

I also deal directly with our design team and clients to help them formulate ideas around what is possible and what we can do for them. As I have experience within the industry, I can recommend certain ways to improve their plans or reach their goals in a realistic manner.

While my job is mainly back end, as lead I also play a role in sales and presentations to clients. I look at the initial plans that they bring us, conduct a quote on how much this would be likely to cost and then work to plan out how we can achieve what they want. I am also present in sales meetings and client presentations, where my job mainly involves explaining in a technical perspective what we will, or have been doing.

4. Who are all the different people you interact with in your work? Please tell us about them.

On a weekly basis I interact with a range of internal and external stakeholders. As we have to work to our client's specifications, very often we will be working onsite within their company for most of the week. So, often that means travelling to

different locations to work all day in different environments. Even when on site, we have a daily online or physical meeting with all the leads and project coordinators each morning. In this we discuss any issues, progress reports and relevant updates on our projects.
Client meetings also occur quite often as we coordinate with them to explain our progress and address any concerns they might have. Past clients that I have worked for include, Toyota, Carlton Football club and click frenzy.
Internally I deal mainly with our design team and strategy and user experience team. My team works closely with them to make sure we are delivering on all of our goals in an effective way.

5. Please tell us about your interactions with other IT professionals?

Within my organisation the main IT professionals I deal with on a day to day basis are the team that I manage and my own direct manager who coordinates projects. Within my team i take on a leadership role that includes reviewing and editing code made by them, as well as strategizing with them to work past obstacles. We also have monthly development and coaching sessions, in which i sit down individually with each member of the team and discuss their overall aims within the business and how i can help realise them going forward. As previously mentioned i talk to my direct manager at least once a day each morning meeting. I also often coordinate with him by phone or email each day about the particulars of each project.
In a broader sense outside working hours, I normally interact with other IT workers at functions and events. It is quite common for a company to host an event with an open bar for people in certain IT fields. In this way, I often meet people in similar jobs to my own at separate companies. It is an excellent chance to socialise with people with similar skills and network. Plus it is a great way of staying up to date with any big events or technologies that have just been introduced within our field of expertise.

6. What about your interactions with clients or investors?

My main interactions with clients can vary enormously depending on the need or desires of such client. My first interaction typically takes place via email or phone communication, in which i get a rough outline of what exactly a client is trying to achieve. After talking to other internal stakeholders about this, I work with the relevant other teams to estimate a quote for each client. If the client is interested further, they typically come in for a presentation on what exactly to expect while working with us.
If the presentation is successful and the client is willing to go forward, I would then be working to realise the clients needs and goals in more details. Depending on the client, this might be done through a dedicated liaison i sit down and meet with, or internally through a client manager in my own company. Depending on the set up of each project, i would then work closely with a plan developed by the client to set up their website.

7. What aspects of your work do you spend most time on? Please tell us about these.

As I mentioned earlier, most of my time is taken up by actual coding work. Depending on what was being developed, I would use a range of systems or tools, including Github to coordinate with members of my team in working on code. Aside from coding, the remainder of my time is split between managing my team's time and efforts as well as coordinating with our client to make sure we are on the right track.

8. Which aspects of your work do you find most challenging?

While coding is the most time consuming and arduous part of my job, the most difficult part would come down to communication. Often at the first stages of any project I will work with a designer or development professional whose job it is to explain how they want the website to look or function. As we will be the ones building the website, I have to push back and explain in a simple way why this is not always possible. Sometimes I would have to suggest other alternatives we could go with to achieve a similar result. While most clients wishes can usually be done, often seeing them built would result in a range of other problems to the website. Often we have to find a compromise on each plan before it is launched, and come up with a roadmap of how to achieve it. It can be quite challenging trying to explain to a client with limited IT knowledge as to why we cannot actualise some of their plan.

9. Finally, can you share an example of the work you do that best captures the essence of the IT industry?

The best example I can think of at the moment is our work on the Beyond Blue Facebook chatbot that we recently created. It works in such a way that you a person can use it anytime and anywhere and be directed to the resources they need without a person being on the end answering their questions. It is programmed to recognise certain words and phrases and recommended them to certain helplines, websites or other areas depending on what they are looking for.

It was a very typical project that required us to work more closely than usual with the client involved. Due to the very serious nature of what topics we were dealing with and the expected user bases mindset we wanted to be sure the functionality of the chatbot was as close to perfect as we could make it. We also had to work within the existing Beyond Blue website that was currently operating, which meant coordinating with the existing company that hosted it.
After a lot of edits and changes to the chatbot, we were finally able to complete it. It is now operating on the Beyond Blue facebook site.

Blockchain and crytocurrencies

Blockchain is a growing list of records, called blocks, that are linked using secure communication called cryptography. Each block contains a mathematical algorithm that maps data of the previous block, a time stamp, and transaction data. Blockchain uses a distributed ledger, which is usually managed by a peer-to-peer network collectively adhering to a protocol for inter-node communication and validating new blocks. Once recorded, the data in any given block cannot be altered retroactively without alteration of all subsequent blocks, which requires consensus of the network majority (Decuyper, 2017) (Lantz, 2016) (Rubin, 2016).

Blockchain should not be confused with cryptocurrencies, such as Bitcoin, which use blockchain to operate. The first cryptographically secured chain of blocks was described in 1991, however, blockchain really took off from the yet unidentified 'Satoshi Nakamoto' in 2008, when launching Bitcoin (Decuyper, 2017) (Rubin, 2016).

Blockchain uses a decentralised, distributed and public digital ledger system where there are many holders of ledgers and depending on the set up of that blockchain protocol anyone can hold a ledger. Blocks hold batches of valid transactions that are encoded. Blocks can be produced concurrently, creating a temporary fork (Rubin, 2016). In Bitcoin, blocks are given to the holders of ledges who typically try and solve a mathematical problem, which on average takes about 10 minutes by cycling through many different combinations (in the billions) to solve the problem. When a computer solves the problem it sends the solution to the other holders of the ledgers. If a consensus of the majority (more than 50%) of the holders of the ledgers agree with the solution the block from the block from the computer that first solved the problem is added to all the ledgers and a new math problem is for the new blocks is attempted to be solved by all the holders of the ledgers (Rubin, 2016). The computers that try to solve the math problems in bitcoin are called miners and are financially rewarded (currently 12.5 bitcoins, which is close to $150,000 USD) (Bitcoinblockhalf.com, n.d.) each time they are the first to solve the problem (BitInfoCharts, n.d.). This process is a proof of work system and makes bitcoin and blockchain difficult to manipulate or double spend currency (Tech Tips, 2014). This makes blockchain both secure and very trustworthy as the diffuse nature of the network ensure events are without bias and are resistant to attack by even a relatively large number of bad actors. The record of transactions and balances remains secure as long as a simple majority (51 percent) of nodes remains independent.

At its very core, blockchain is a distributed ledger system with verifiable transactions. Through every subsequent transaction, the ledger is encrypted and verifiable throughout the chain. If there is a ledger with 100 transactions, for instance, each transaction is verifiable through its previous and subsequent transaction. In short, blockchain can provide anonymity and trust to verify and audit any activity (Zahreddine, 2018).

Currently, blockchain has been predominately focused on cryptocurrencies such as Bitcoin and Ethereum. The idea of cryptocurrencies is to create a currency that is

decentralised and therefore not interfered with by a government, easy to transfer, trustworthy and in most circumstances does participants can remain anonymous. It is expected that cryptocurrencies will continue to grow, however, are unlikely to replace government backed currencies. This is because more and more transactions are taking place online and e-commerce, is expanding. Given cryptocurrencies were developed for online transactions it is natural that they too will expand and been more common for everyday use. Furthermore, cryptocurrencies will provide appealing alternatives to fiat currencies in the inevitable event of a market correction for example they will be seen as place to store value like gold. When other currencies falter, people may turn to blockchain to safeguard their savings and move money across borders, strengthening the technology's footprint while the wider economy struggles (Wintermeyer, 2018). It is still unclear as to how the job market will be impacted by cryptocurrencies (Pawłowski, n.d).

However, blockchain has been expanding to other areas such as smart contracts. Smart contracts are self-executing contracts with the terms of the agreement between buyer and seller being directly written into lines of code. The code and the agreements contained therein exist across a distributed, decentralized blockchain network (Decuyper, 2017(Frankenfield, 2019).

Smart contracts permit trusted transactions and agreements to be carried out among disparate, anonymous parties without the need for a central authority, legal system, or external enforcement mechanism. They render transactions traceable, transparent, and irreversible. In a normal world process for getting a court-registered document as a proof, you would need to go to a lawyer, give them money in turn of their services and wait till you get the document that you need. Smart contracts can eliminate this need as they become a trusted source (Pratap, 2018).

Blockchain is also developing further into the finance sector (Lantz, 2016). An example is the Australian Securities Exchanges (ASX) is undertaking a project that intends to replace the current CHESS share trading platform into a blockchain version. The ASX has given the following reasons why they are undertaking the project (Asx.com.au, n.d.):

6. Operate for the benefit of issuers and end investors
7. Take future needs into account
8. Accessibility
9. Ease of integration and global interoperability
10. Availability, reliability and performance
11. Privacy and security
12. Operational efficiencies

Another development is using blockchain in a supply chain to guarantee that the proper process and correct manufactures were used, for example to make sure that a fraudulent activity has not occurred within a pharmaceutical supply chain which can have life threatening effects. This will make auditing of supply chains more readily available, more efficient and harder to compromise. It make the supply chain more safe and secure. (Lo, 2017)

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GROUP REFLECTION:

What went well?
What could be improved?
At least one thing that was surprising?
At least one thing that you have learned about groups?
Remember to include in your section on Tools how well you think your Github log of activity reflects your group's work on this assignment

Overall, while the group did face some initial challenges in its organisation and coordination, I feel that we did work well together.
As in any group assignment, there were communication problems around allocating work and assigning responsibility. This was emphasised more due the the online nature of the course. Being unable to meet up in tutorials or at a physical location makes it harder for the group to properly communicate.
However, after a slightly slow start the group pulled together well, with everyone proactively pitching in what work they would be comfortable doing. A member of our group also suggested and set up a Discord server to use to communicate with others. This allowed us all to talk in real time about the project and any difficulties faced. For instance when Tim asked the group about uploading files to Github, Sebastian was able to demonstrate with screenshots the correct method.
The most surprising thing we found was how almost every member of the team stepped up independently to contribute when needed. In past group projects it is quite common to see only a few individuals do the majority of the work, while the remainder of the team does very little. In this project though, after an initial suggestion of how work should be assigned, everyone volunteered to take parts on themselves.

After discussing it on Discord together, we have all come to learn quite a few new things about working as a group. For instance, in order for the group to function it is important to have a platform that everyone can engage in and share ideas. Members of the group also felt that while we did not have a clear group leader that stepped up to allocate and assign work, we were still able to function to complete the project. Quite a few of us thought this was surprising, as while individual autonomy works well in self projects, group projects usually require a clear leader who steps up to organise everyone. Since the project lacked such a leader and still was completed, we learned that as long as we were all committed to success, no single individual needs to bear the burden of the work or organisation.