



Welcome to Project Extension

Thank you for downloading this report.

This report outlines who we are, our knowledge and experience and our exciting new project. For more information please see our website (https://peterjohn89.github.io/Assessment_2/index.html).

Peter Goodwin is hosting our GitHub page. The group repository can be accessed [here](#).

Table of Contents

Welcome to Project Extension	1
Who are we?.....	2
Our Team:.....	2
Andrew Waltos	2
Dylan Moore	2
Kaleb Tomaszek	2
Michael Hayes.....	3
Peter Goodwin.....	3
Our Team Profile:	4
Our career paths:.....	5
Working in IT (<i>Interview with an IT professional</i>):.....	7
IT Technologies:	9
Small Computing Devices	10
Cybersecurty	12
Natural Language Processing.....	15
Machine Learning	17
Our Major Project.....	20
Mindgames	20
Our Group Feedback.....	21

Who are we?

Based at RMIT University in Melbourne Australia, Project Extension is a part of the next wave of Information Technology start-ups cropping up all over the world.

No longer is Silicon Valley, or even the USA the only home of IT innovation. With our constantly connected world, innovation and hard work can spread across the globe.

Our team has members from both coasts of Australia, from as far apart as Queensland's Gold Coast to Western Australia's capital Perth, from Sydney to Melbourne and even from in-between.

The five of us came together in our first year RMIT, in fact this is how we came up with our name. We were all placed in "Assignment Group 6". From that we noticed that 6 is 110 in binary and if we took the letters from 1(one), 10(ten) and 6(six), we could create Extension. The idea of pushing further and extending ourselves and the IT industry is what drives us forward through our studies today.

Our Team:

Andrew Waltos

(<https://rtsht.github.io/website//>)

Andrew has been involved in Project Extension from the beginning (as a founding member) and his interest in IT was sparked very early in his life with video games. Now a student at RMIT (student number s3791004) studying a Bachelor of IT via OUA, he is on the way to a career change within the IT industry. His IT background is primarily as a hobbyist, fixing and upgrading his own and family computers, learning code, playing video games. When not at work, as a motorcycle mechanic, or studying, he can be found fishing or playing guitar or hanging out with friends.

Dylan Moore

(<https://s3791202.github.io/>)

A member of Project Extension Dylan (RMIT Student number: s3791202) is located on the Gold Coast. Dylan grew up in Adelaide and has a lovely wife. He decided to go for his Bachelor in Information Technology because of his fascination about how computers work and how they play such a vital role in the world. He wanted to develop and learn new skills to help make life changing programs to make the world a greater and safer place. Dylan used to play video games at a young age and still does on a occasion play sport games when he has time. His favourite game at the moment is FIFA 19 which is created by EA Games.

Over the years Dylan has developed knowledge in IT gained by experience with fixing other people's computers and even his own laptop. His wife had been telling him he should get a bachelor in IT, and he decided this year he would pursue this. His other hobbies include fishing and creating lyrics to write Christian rap songs. When he isn't at home studying for his Bachelor, he is doing some landscaping work with a friend that runs his own business.

Kaleb Tomaszek

(<https://mkhurtz.github.io/Stellar/>)

A founding member of Project Extension, RMIT Student Number: s3775652, Kaleb Tomaszek lives in Perth, WA. Like many, his interest started while playing and realizing how far computer games have come. Undertaking a Bachelor of IT course at RMIT through Open Universities Australia, he hopes to be a part of the future of IT programmers that will change the way we see and use our gadgets. This is Kaleb's first venture into IT with no prior degrees, although he has a strong mathematical and mechanical understanding which will carry him to

completion. Once Kaleb finishes his Bachelor of IT he hopes to progress straight into becoming a games developer.

Michael Hayes

(<https://mhayes486.github.io/CPT110Assignment1/>)

One of the founding members of Project Extension, Michael (RMIT Student number: s3775639) is based in Bendigo, Central Victoria. Michael grew up in Bendigo, where he now currently has a wife and two young children. Michael started with RMIT in 2019, taking an online Bachelor of IT course through Open Universities Australia. Michael said he always had an affinity for computers when growing up. "Growing up in the 90s, I was so thankful for computers, not only for being able to look things up on the internet but even for simple things like MS Word's spellchecker". Michael has returned to higher education after ten years, two years ago completing a Certificate IV in IT Networking from the Gordan TAFE last year. He always enjoyed coding at school and with the support of his family and employer, he decided to enrol with the aim of a career change in the future. Outside of IT and his current job, Michael enjoys travelling, spending time with his friends and family and cooking.

Peter Goodwin

(https://peterjohn89.github.io/Assessment_1/)

Peter enlisted his skills in web development to be a founding member of Project Extension (student number s3793762). Before moving to Melbourne three years ago, Peter studied a Diploma in Web Development and a Diploma in Graphic Design. Although Peter was born in Brisbane his background is very mixed, with a range of different nationalities, from Eastern European to early Virginia African American. Peter works as a Junior Web Developer and studies a Degree in Information Technology at RMIT. His goals are to one day work in the IT industry overseas, hopefully on a nice tropical island.

Our Team Profile:

As individuals before joining this team we have all completed a variety of personality tests (results outlined below):

<u>Member</u>	<u>Ideal Job Titles</u>	<u>Myers Briggs results:</u>	<u>Learning Styles:</u>	<u>Other test type</u>
Andrew Waltos	Software Developer	"Architect" – INTJ Introverted Intuitive Thinking Judging	Visual(40%), Audio(35%), Kinesthetic/Tactile (25%)	Numerical Reasoning Test
Dylan Moore	Web Applications Developer/Programmer	ISFP - Introvert Sensing Feeling Perceiving	Audio (55%), Visual(20%), Kinesthetic/Tactile (25%)	Creativity Test
Kaleb Tomaszek	Game Development Software Engineer	"Virtuoso" -ISTP Introverted Observant Thinking Prospecting	Visual(45%), Tactile(35%), Kinesthetic/Audio (20%)	Big Five Personality Test
Michael Hayes	Staff Software Engineer	"Logistician" -ISTJ Introverted Observant Thinking Judging	Audio(42%), Visual(34%), Kinesthetic/Tactile(24%)	EQ Test
Peter Goodwin	Web App Developer	ESFP -Extraversion Sensing Feeling Perceiving	Kinesthetic/Tactile(74%), Visual(69%), Audio(62%)	Self Esteem Test

As you can tell from the results our team is heavily focused on developing/programming. With the full range of development types from web applications, to game development to a more general software development. Our career paths are very similar in a lot of ways and our ideal jobs highlight that we have not taken on this challenge of higher education lightly but as the next step on the long road to gain our ideal jobs.

Our test results also highlight one of our strengths in the group; our variety of skills and styles we bring to the table. There is some overlap in our Myers-Briggs type testing, but we still have at least one member with each of the possible outcomes. For example, while the majority of the team is classed as having introverted tendencies, we still have an extravert member. This is also reflected in our learning styles, as a team we all learn in different ways (Audio(A) based, Visually (V) based or Tactilely (T) based). As a team we work to overcome these differences by having options to communicate via message-boards or via voice using websites like discord. This teamwork is one of the major advantages we offer to all our clients. Finally, as further proof of our ability to work with the differences in strengths of our team, look no further than the 3rd test result. This test was an open option for our team to pick a test and share the results. As you can see the tests picked by each individual member highlights something about that member and where they see their strengths and weaknesses. Some were logic based (e.g. numerical reasoning), some were creativity based and some were more personality based in nature (e.g. Big five personality test).

For more information about our team, please see the project extension website:

https://peterjohn89.github.io/Assessment_2/index.html

Our career paths:

As mentioned earlier, this team is the next step for us to get to our ideal jobs. So that each member of the team is prepared to achieve that ideal job we compared our roles to some industry data provided by Burning Glass (via RMIT University). We compared our individual roles to the data collected for the year March 2017-March 2018. After completing this research, we also asked ourselves if our opinion had changed in regard to our ideal jobs. The results are below:

Andrew Waltros	<p>Job Title: Software Developer [ranks 19th, 337 listings in a 365 day period]</p> <p>Skills required:</p> <ul style="list-style-type: none"> IT-specific: SQL [ranks 1st, 3570 listings] 3 highest not present: JavaScript, JAVA, Microsoft Windows General: Teamwork/Collaboration [ranks 5th, 14364 listings] 3 highest not present: Communication Skills, Problem Solving, Organisational Skills <i>Opinion changed?:</i> No. This is still an idea job for me. Industry data is a good tool to use for comparisons but I still would rather seek out a position that appeals to me and what I want to be doing day to day.
Dylan Moore	<p>Job Title: Software Developer [ranks 19th]</p> <p>Skills required:</p> <ul style="list-style-type: none"> IT-specific: SQL [ranks 1st, 3570 listings] 3 highest not present: JavaScript, JAVA, Microsoft Windows General: Teamwork/Collaboration [ranks 5th, 14364 listings] 3 highest not present: Communication Skills, Problem Solving, Organisational Skills <i>Opinion changed?:</i> No. This hasn't changed my opinion due to the fact that my job is ranked 19th on burning glass. I have a passion to build my own software and see it used all around the world if my idea's are life changing innovation.
Kaleb Tomaszek	<p>Closest job title: Software Engineer [Ranked 11th on top titles with 539 listings, Ranked 1st on top occupations with 29455 listings]</p> <p>Experience Required: For the Senior position 4 years is required, but there are entry level jobs available in the same field in order to gain that experience.</p> <p>Skills Required:</p> <ul style="list-style-type: none"> IT Skill Requirement: C++ is needed for the position General Skill Requirement: Communication, problem solving, organizational and writing are the top 4. Of these skills I need to learn C++ and increase my proficiency in communication, organization and writing. <i>Opinion changed?:</i> No. The position I am aiming for is an end goal and will not be the first job i achieve after completing a Bachelor of IT. Though my opinion may change over the next few years, becoming a game development software engineer is currently what I want to focus on becoming.
Michael Hayes	<p>Job Title: Staff Software Engineer [Ranked: 20 (out of 25 on Top Titles data from Burning Glass) with 336 listings (<i>Senior Software</i></p>

	<p><i>Engineer</i>). Ranked 1st in Top Occupations (29,456 listings (Software Developer/Engineer))</p> <p>Experience required: 8years+ is only required in 10.5% of listings (from Buring Glass, 6 to 8yrs)</p> <p>Skills required:</p> <ul style="list-style-type: none"> • IT-specific: Mainly Software Engineering (ranked 15th in Burning Glass data), although the role would probably also include SQL (1st), JavaScript (2nd), JAVA (3rd), Microsoft C++ (12th) • 3 highest not present: SAP, Microsoft Windows, Business Analysis • General: Mainly Teamwork/Collaboration (ranked 5th), Leadership (ranked 11th), Mentoring (ranked 13th) and Communication Skills (ranked 1st). However, to a lesser extent problem solving (2nd), organisational skills (3rd), troubleshooting (6th), planning (7th) and team building (18th). • 3 highest not present: Writing (<i>unless it's writing code</i>), research, detail oriented. • <i>Opinion changed?: No</i>, as this job is a long term goal not a short term one (over a decade away at this stage), having the large amount of skills required is not a concern at this stage. Given also the flexibility of roles on offer with some of or similar skill sets, if I work to obtained them all, it should put me in good stead to get similar roles along the way.
Peter Goodwin	<p>Job Title: Web developer [Ranked 15th with 381 listings, 6th on Labour Insight Jobs (Burning Glass Technologies) with 5,990 listing.]</p> <p>Skills Required:</p> <ul style="list-style-type: none"> • In Web app development, JavaScript [ranked 2nd], Java [3rd], Git [22nd]. • 3 highest not presented skills: Python, Project Management, and SQL. • General Skills Required Problem Solving [ranked 2nd], Planning [7th] and creativity [9th] are all within the top 10 skills in greatest demand. • 3 highest not presented skills: Writing, Presentation skills, and Team building. • <i>Opinion changed? No</i>, The position I am interested in has skills and experience that I must develop over time, However, I feel that I have a better understanding of what skills are crucial to become a better app/web developer.

Working in IT (Interview with an IT professional):

Before starting this company, we researched extensively on what working in IT involves. We canvased widely and interviewed many IT professionals. Below are the results of a recent interview conducted by one of our team **(Peter Goodwin)** with an IT professional:

Name: Michael M^cCoy

Role: Manager (ICT & Marketing)

Interview date: 08/04/2019

1. Why did Michael decide to take on a career in IT?

I decided to start my career in IT, which was network engineering, because of my love for technology. To be honest, it was all the IT guys in my high school that helped me decide where I wanted to go with my IT career. It was years later, with the help of some colleagues in the Federal Government, that changed my thinking and head into the cybersecurity industry.

2. What has been the biggest change in his role/the industry over the last 5 years? (Mobile-friendly?)

Technology is always changing and the biggest change for me is probably the cloud technology that is available now. Adding to that, it could also be all the devices that are now available and now has been developed and used in the real world, such as the Internet of things (IOT).

3. What sort of problems do you encounter day-to-day and how do you fix them?

The biggest thing about the position now is leadership and trying to produce the best effort from my team. Secondly, looking after all the computers and network within the organisation, and making sure everyone has the resources to their job to the best of their abilities.

4. What advice can you give to someone looking to get into the same field as you? Languages to learn, programs, etc?

At the moment, in today's environment, I would not recommend the network engineering environment unless you want to work for companies that provide cloud services. My recommendation in the programming languages would be to learn Swift, PHP, JavaScript, Java and Python or go into an area within the cybersecurity industry.

5. What kind of work is done by the IT professional?

IT professionals operate in many different roles, such as cyber security, networking, software development but are, and must, work in a collaborative environment because they must work together to make sure that all areas are covered.

6. What kinds of people does the IT professional interact with? Are they other IT professionals? Clients? Investors? The general public?

It really depends on what your job title is and what kind of industry you are working in. Secondly, the size of your company also has an impact on how much contact you have with different types of people.

If you are trying to start your own company, you would have contact with professionals, clients, and Investors. But if you work within a Government facility or organisation, your clients would be, most likely, the people inside your organisation.

7. Where does an IT professional spend most of their time?

Most of the time IT professionals are sitting behind a computer. Unless they are working on server rooms or helping connect computers up. This is why chairs and posture are so important.

8. What aspect of their position is most challenging?

Leadership is the most challenging aspect but is also rewarding when you see the projects that your team have worked on. This is challenging because you want to give your team the resources, time and rewards so they develop and also know they are doing a good job.

IT Technologies:

We here at Project Extension also stay abreast of the latest technological innovations in the world of IT. Below are four sample reports from our team on 4 of the biggest emerging technologies of our time:

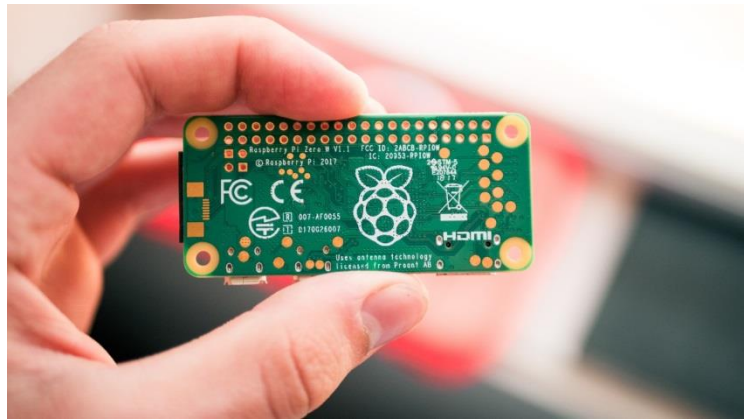
- 1. *Small Computing Devices by Andrew Waltos (page 10)***
- 2. *Cybersecurity by Dylan Moore (page 12)***
- 3. *Natural Language Processing by Kaleb Tomaszek (page 15)***
- 4. *Machine Learning by Michael Hayes (page 17)***

Small Computing Devices

(Raspberry Pi, Arduino, Makey Makey, etc.) By
Andrew Waltos

What does it do?

Today, when we talk about small computing devices, we are referring to small devices (roughly credit-card size or smaller) that can communicate with various inputs and outputs, e.g. sensors, cameras, monitors, speaker, lights, etc. These devices can be micro-controllers (Arduino) capable of storing instructions in a chip and executing those instructions to various connected sources. They can also be fully capable computers (Raspberry Pi) with operating systems as well as input/output controllers.



There are different models available, some have Wi-Fi, Bluetooth, HDMI, USB, Ethernet. There are different models with different features to suit varied requirement of projects and budgets. All of these are generally cheap and small. There are also many adapters and input/outputs available that are designed specifically for these systems, making them expandable depending on how someone needs to use it. As well as being small and cheap, there is a massive amount of information available online as people generally like to share their achievements and help others learn how to create and code. This community is extremely beneficial to the technology's success as it makes it so much more accessible and less daunting to those who have never tried it before.

The ever-shrinking transistor and other computing components allow these small devices to be so accessible in everyday use. The hardware is cheap to manufacture and can be produced anywhere and the other important component is software – freely available through open source and constantly being updated and shared. The devices are perfect for education. Learning to code and understand how various computing components interact with each other is made so easy and the information is freely available online or in magazines and books at libraries.

We may see these small computing devices become more popular and find new uses as other emerging technologies develop and become mainstream. One possible example is 3D printing and robotics. Soon it may be quite feasible to have a 3D printer at homes/schools and be able to create robotic machines and program them via Raspberry Pi/Arduino.

The past model releases have seen increases in performance through faster chips and addition of connectivity features. These improvements will likely continue to be enhanced in upcoming versions/models and possibly even brand-new units altogether.

As technology and demand for these devices increases, we may see them get even smaller and more refined in terms of aesthetics and integration. As battery technology gets better and allows for smaller and higher capacity batteries, we could see this small computing market branch out to new and exciting things that are no longer tethered to an AC power supply. With WIFI, Bluetooth and even wireless charging we may no longer see any cables attached to certain applications. This technology is at our door right now and as it develops, we will see an increase in use which will lead to further development of new technologies.

What is the likely impact?

These tiny computers and controllers allow people to have more independence with computing and implementing technology into their lives. The devices are cheap, and the information is available easily. Instead of going out and buying that expensive tech tool that only does one particular thing, you can now make it yourself, refine the code, adapt it to other uses or environments, or re-program it to do another job altogether. In a practical sense, these devices will enable consumers to become slightly more technology independent from the current system in the market. Traditionally, we are at the mercy of large tech companies in regard to when they release products and perhaps more importantly when they update or upgrade these products. These companies currently are focused on generating the highest revenue possible and will often slow-release technology and updates which encourages consumers to go out and regularly buy the 'latest and greatest' iteration of that device. This creates unnecessary waste and slows down the advancements in technology. When we put the power to create, share, and improve in the hands of the community we encourage development and advancement. If more people are contributing to the advancement of tech, we may see more problems being solved faster and more efficiently.

The devices are a fantastic teaching tool and are currently used in schools. We will likely see more children growing up with coding and problem-solving skills which is a great benefit for future generations. These devices can help teach kids at a very early age about controllers, connectivity, and programming. They can be very basic as well as extremely complex allowing for a wide range of teaching. It is also fun and encourages children to interact with each other.

How will this affect you?

Day to day, I am constantly interacting with some sort of technology, it is very difficult not to. I also have tasks to do throughout the day both in and out of work. These small devices may be used to automate some tasks and help to make others more efficient. We currently have mobile phones to help with similar things – set alarms, reminders, video conference, email, shopping, hail taxis, etc. I think we can take this a step further by implementing small computers into our daily lives so that we have more time to do the things we enjoy. The industrial revolution saw machines replace the heavy and dangerous jobs that people used to do. The machines became a cheaper, safer and more efficient way of doing things. In a similar way but perhaps smaller scale we may see a technological revolution, and this would offer me more time spent doing what I enjoy. Family and friends would benefit from this technology as well, as they could use it to improve their lives also. They could connect devices to make a 'smart home' and keep track of important components such as lights, oven, fridge, etc. This is also beneficial as we get older. My parents are ageing now and having the ability to make their lives safer and easier is prime concern for me.

As this tech and supporting technology develops and becomes less dependent on a fixed line power source, we will see it more and more in our everyday lives.

Cybersecurity

By *Dylan Moore*

Cybersecurity refers to the practice of ensuring the integrity, confidentiality, and availability (ICA) of information.

What does it do?



Cybersecurity is software and methodologies designed to protect connected devices to the internet, which includes any important information from any unwanted hackers.

The main rules behind Cybersecurity is confidentiality of the users' information.

The Integrity refers to methods of ensuring that data is real, accurate and safeguarded from unauthorized user modification. And availability which means to always have the information available to access and safe from any attack. According to Wikipedia "Confidentiality, integrity and availability are also known as the CIA triad".

I would like to explain the origin of Cybersecurity and how much it has evolved over the years.

The first cyber security breach incident that was noted in history was a program called "the creeper". The purpose of this experimental program that had been created by a man named Bob Thomas was to move across the networks leaving not much evidence behind wherever it went, it would target "Tenex terminals on the early Arpanet, leaving a warning message behind " I'M THE CREEPER: CATCH ME IF YOU CAN".

A programmer by the name of Ray Tomlinson who had invented the email later on in 1971, had liked the idea about the creeper he had created a worm replicating the same software as the creeper, but his goal was to make a program that would track it down he created the first antivirus software called "Reaper" this program would automatically delete the code of the "Creeper".

In 1988 Robert Morris decided to make an experiment. His purpose was to measure the size of all the internet. This was an experiment, but it had turned into a threat on the internet- this worm had slowed down the internet drastically, which had caused damage of millions of computers that amounted to the financial loss from \$100,000 to \$10,000,000. This worm had infected computers within literally fifteen hours, and those computers needed to be fixed. It normally would take up to 2 days for the anti-virus to fix the computer.

There is a wide variety of different software programs that are aimed to protect computers from cyber-attacks.

- Network security protects the user's network by controlling what commands are incoming through their firewall and outgoing.
- Data Loss Prevention (DLP) protects data from being leaked, it has a built-in intelligence to the software of knowing where everything is located and keeps a high demand on keeping your information at rest in use or in motion.
- Cloud Security delivers strong fortification for your cloud-based services which is any software that you would use to link to the cloud.

- Intrusion Detection Systems (IDS) or Intrusion Prevention Systems (IPS) have been programmed to detect any hostile activity, to monitor suspicious behavior on the network and send reports to the administrator, so that the administrator is aware of the malicious behavior that is happening on his network.
- Data Encryption is a highly secure way of keeping your data safe. The main purpose of this software is to encrypt your files and make it impossible for a hacker to be able to decrypt or even have access to.

Another very common cybersecurity software is called Antivirus/anti-malware.

What is an antivirus created for? The main reason why a computer needs to have an anti-virus installed on our computers is to make sure the file that has been downloaded or the link that you have clicked hasn't been infected.

The anti-virus scans the computer for any harm that was done by a virus or a worm. It searches for a specific algorithm with its behavior. Then once located it automatically deletes the infected program.

There are currently 51 Anti-Virus software for windows computers on Wikipedia, and 21 Anti-Virus software for Mac computers on Wikipedia

https://en.wikipedia.org/wiki/Comparison_of_antivirus_software

These are the 10 Top Cybersecurity Companies listed in Google

- CyberArk Software (NASDAQ:CYBR)
- Cisco (NASDAQ:CSCO).
- IBM (NYSE:IBM).
- Microsoft (NASDAQ:MSFT).
- Amazon (Amazon Web Services) (NASDAQ:AMZN).
- FireEye (NASDAQ:FEYE).
- Lockheed Martin (NYSE:LMT).
- Check Point Software (NASDAQ:CHKP).

How this could affect me and my family in our daily life.

The internet is something that we use on a regular basis- we use internet banking to transfer funds into other accounts and pay our bills, we use different online services, and if hackers could somehow have access into our bank accounts just because of a security breach on Commonwealth's network that would be disappointing.

There are many cyber-attacks occurring these days that we don't even know about.

There is a website to checked if your data has been leaked or hacked. For example, I have discovered that two companies whose services I've been using have been hacked for their customers' data including passwords. And I haven't even been notified.

<https://haveibeenpwned.com>

There is also a YouTube video with a guy that can send a text message onto a person's phone with a download link from a third-party software pretending to be a reliable company. Then once the app has permissions it can read through all the files just by having the app installed without any trace of evidence that your phone and all of your data has been compromised. Please see the link below

<https://www.youtube.com/watch?v=QiM35Pml2dQ&t=408s>

There is another interesting video on YouTube where a hacker could have access to business equipment just by using a telephone and implant a chip into it, then he was able to listen to all the phone calls. He could even trick the phone by putting a bug into the system making it say on the screen its “disconnected”. My thoughts are- what if a hacker could do this same idea and he would put something on a product from EBAY or Gumtree, technically anything we use to get a better deal, and we wouldn’t even know it has been hacked. Please see the link below

<https://www.youtube.com/watch?v=5GnMj5cus4A>

There is another case where a hacker pretends to create a local Wi-Fi hotspot. This could be an easy attack if you were at the shopping center and wanted to use the shopping centers Wi-Fi. This hacker was able to access all the files on the Mac and could even turn on the persons web camera.

<https://www.youtube.com/watch?v=CV39QzFpJx4>

According to AVtest 250 000 malicious computer programs are invented daily. 1 250,000 hackers make malware applications daily.

These examples are only the tip of the iceberg, and there are many more instances of cyber-attacks. And we really need to develop stronger methods to protect the internet.

Bibliography

Info that I used to help me write out about Cybersecurity

<https://www.forcepoint.com/cyber-edu/cybersecurity>

<https://www.sentinelone.com/blog/history-of-cyber-security/>

Natural Language Processing

By *Kaleb Tomaszek*

What does it do?

Natural Language Processing (NLP) is the ability for computers to process unstructured data.

Companies that want to make their systems or operations more efficient use analytics to process and create solutions to problems, but only 20% of data available is structured correctly to be read by computers.

With the advancement in AI technologies, the other 80% of unstructured data is becoming more readily accessible to computers.

As documents are read by machines, they pick up on the repetition of words and cut out joining words e.g. for, is and with.

AI is also becoming more able to distinguish between a word with different meanings such as foot, being a body part and a length of measurement.

Previously, a search may return only specific word matches, and nothing associated, so if a search is made for 'lower body injuries', those 3 key words are all the search will return, but due to the advancements, AI can now distinguish and locate other files such as lower back, leg, knee pain or foot injury.

As NLP continues to grow, more and more companies are moving to utilize it, with a suspected 95% of software companies using the technologies by 2020 predicts Deloitte.

Another large aspect of NLP is the ability to process online inquiries without the need of a support team.

Online Chatbots are being implemented to receive inquiries and provide adequate answers, and even pre-empt inquiries from customers, reaching out to them to provide assistance.

Of course, the expenses will be large as companies switch to using Software as a Service (SaaS) over their own legacy systems.

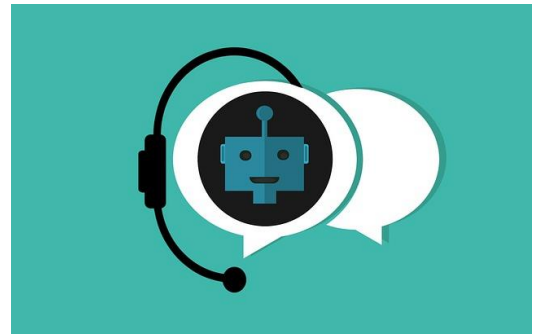
There is still a lack of understanding surrounding cloud computing, which is the current generations hurdle and will continue to hinder company growth for a while into the future.

Currently one of the greatest extents for NLP would be the communication between yourself and any smart home devices.

Being one of the most revolutionary devices available on a consumer level, it is a device that uses voice recognition to be able to interpret its users' intent and receive commands.

A simple example would be that any smart home device can play music while attached to your home sound system. Just from using a command word, (like "Playstation", "Alexa" or "Google"), you're able to activate the devices voice recognition and then provide your next command.

You can ask the device any array of questions or tell it to do something. You may ask it to change to the next song, turn the volume up or down, or add a new song you like to a playlist, or use it for future song suggestions.



With the ability for machines to understand almost any variation of accent on the same language, they can receive commands from almost any person.

The future of NLP is growing exponentially as multiple market statistics have gathered that data volume is doubling every 2 years, and with that, 80% of it is unstructured data.

NLP will be needed more than ever as the mass of data continues to expand, being at the forefront of text analysis and voice recognition.

Sentiment analytics is the future of marketing, with companies needing to have statistics on how their customers are thinking and feeling toward their product.

NLP is used to generate sentiment analytics as it is able to deduce a customer's emotion toward an item, rather than just knowing if a customer typed in a specific key word that the company is performing analytics on.

What is the likely impact?

As AI continues development, all companies will begin to use it for sentiment analytics, this will lead to never before seen accuracy in targeted advertising.

All companies will use NLP to process vast amounts of information, being able to decipher a customer's opinion toward a product without having to sift through reviews manually.

Jobs in technical support may no longer be necessary, both online and over the phone.

With NLP, website customer service is able to determine when a customer needs help and actively ask, as well as providing a prompt response so that a potential customer is not lost to the company.

Jobs in online technical support will no longer be necessary as one person may only be able to serve one customer at a time, but AI can serve as many as its hardware is capable of processing.

Over the phone support can be reduced to multiple passageways that accurately suit the information a customer is after, once voice recognition is activated and it is determined what service the customer is after, they can be directed specifically to the place they need to go, the person they need to see or the information they were after.

The people mostly affected will be the unskilled, leaving less jobs for those that have not gathered experience or attended and completed a degree.

How will this affect you?

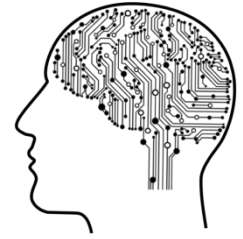
After completing this course, I hope it will aid in making future work easier, the company I work for will be able to hire less staff for unskilled support roles and have more funding for what is necessary.

NLP may be able to, in future read a large base of customer reviews from many different sources and compile a list of most recurring feedback good or bad.

With this information, it will be easier to locate common issues that need resolving, see what customers are looking for in future updates or even see what customers are enjoying most about a product or service.

Machine Learning

By *Michael Hayes*



What is Machine Learning?

Machine Learning is a type of Artificial Intelligence (AI). Unlike some other forms of AI, Machine Learning is dynamic. This means the code/algorithm can change over time as the program is presented with more data and “learns”.

Machine Learning has been around for decades but has really come to the fore with the increase in computing power now available and the advent of Big Data. “In 1959, Arthur Samuel, one of the pioneers of machine learning, defined machine learning as a “field of study that gives computers the ability to learn without being explicitly programmed.””¹

Basically Machine Learning, automatically adapts its algorithms as more data is presented. Data is entered or collected and then analysed by the program. The program then makes predictions based on the data it has received. If the predictions are incorrect, the program notes this as more data, changes the algorithm again and makes another prediction. Each time getting closer and closer to the “true” answer.

Essentially Machine Learning is not just data analysis but making predictions on that analysis that changes as more data is provided.

Broadly there are branches of Machine Learning; *Supervised Algorithms* and *Unsupervised Algorithms*.

Supervised Algorithms, usually involve someone (say a data scientist or machine learning expert) entering the data and the results of the data into the algorithm and testing the predictions compared to the real world outcome. The algorithm is then trained to achieve the correct outcome.

Unsupervised Algorithms, work on a deeper level, using huge amounts of data to draw conclusions. Deep Learning and Neural Networks are two types of these types of algorithms. They are used in image analysis (and “understanding”), text to speech and even in the famous software where a computer won against a human for the first time in the chinese game of Go.²

Currently machine learning is being used:

1. to beat people at Go,
2. to customise social media news feeds,
3. in your digital assistants like Siri or Echo (speech recognition),
4. Search engine results,
5. Web advertising (that follows you around),
6. Email/spam filtering,
7. Even voice manipulation and voice counterfeiting (like Lyrebird <https://myvoice.lyrebird.ai/>)

Machine Learning isn’t infallible however. Like much with computers and programs Machine Learning does suffer from “Garbage in = Garbage out” principle. If faulty data is harvested, entered or acquired, then the predictions will be also faulty. This faulty data can even have a determination effect on the algorithm long term as it tries to shape the algorithm to better suit the “true” outcome, skewing both good and bad data to fit the result.

A famous example is with a few image analysis Machine Learning algorithms which were deployed in a few hospitals in the USA to test if they could identify major medical issues in patients based solely on an x-ray. What ended up happening was that the algorithm “learnt” that when the word “portable” appeared on the x-ray that the patient was more likely to have the condition it was trained to discover and flagged the file. Not because it had really found the issue, but just because more often than not if a patient needed a portable x-ray taken, it meant the patient was too sick to be moved to radiology, therefore had the condition.³

This is an example of correlation vs causation problems that can arise from data analysis. As deep machine learning algorithms deal with so many data points and so much raw data to make its prediction, these types of false connections will need to be trained out of the algorithms going forward.

What is the likely impact?

Machine Learning will have a major impact on the digital landscape as the algorithms and the “training” they receive improve. Day to day the most obvious change people will encounter is the further targeting of content to them. Website adverts will not only be more relevant but also more effective to get you to purchase. The theory of Facebook listening to you will have fallen by the wayside as your “news” feed and targeted ads will feel like Facebook is reading your mind.

It would be hoped that government policies would also be improved as the data analysis may provide better understandings of how effective the policies have been and what other possible effects there could be from a change in those policies.

Medical imaging is often touted as the place where Machine Learning Algorithms will have the biggest impacts. The idea is that software will be able to analyse x-ray (or other types of medical images) and diagnose patients without the need for radiologists or medical imagists. I believe this is a long way off, but in the short to medium term I can see software using Machine Learning Algorithms used to supplement a radiologist, pointing out areas of concern to them. The radiologists would then be able to “train” the algorithm if what it has “detected” is really a concern or not, improving the results of the algorithm.

Health data overall could be another big area of growth for Machine Learning. Not only in areas like drug or medical device trials, but also risk factors and treatment outcomes. Hidden (and subtle) links between minor issues and major treatments could be discovered.

Already Machine Learning is used in text to speech conversions, natural language chatbots etc but as these algorithms grow and learn they may be used in conversational translations, leading to less translation based jobs and possibly reducing the amount misunderstandings that occur between people of different linguistic backgrounds.

How will this affect you?

Personally I am sure that Machine Learning will affect me in many subtle and not so subtle ways in the future.

Some of the more obvious ways I say this technology affecting me include:

- Not only more advertising based on what I have view/clicked on, on the internet, but having that advertising even more targeted to me (and unfortunately more effectively targeting me (which will make me buy stuff)).

- Advertising is only the tip of the iceberg for businesses to capitalise on Machine Learning however, I am sure I will see business make decisions based on Machine Learning data analysis more and more.
 - Getting a new job might be harder as businesses using an machine learning output based on my resume (and social media content) and maybe even a questionnaire to determine if I would be a good employee, before even meeting me.
 - Similarly a bank will use these algorithms to determine credit applications and mortgages. This may be a good thing as the bank should use the information to provide only the level of credit needed for the customer and what they can afford. However as the recent Royal Commission into Banking in Australia recently highlighted, those same algorithms could also help banks target consumers who are more likely not to pay off their credit cards on time, therefore attracting a fee, which profits the bank.
- Professionally in my current position at a Dental Clinic, the advent of a x-ray image analysing algorithm (with a high success rate), would be a major change. We take multiple x-rays per week and having a tool to assist the dentists in finding subtle warning signs would be great for our team and our patients.
- If this technology becomes cheaper and more ubiquitous, schools will also be able to possibly further tailor there educational support for students based on each individual's data, which would also benefit my kids as they are just starting school.

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Our Major Project

Together the team here at Project Extension having been planning out our first major collaboration project:-

Mindgames

Mindgames is an interactive gaming website and application, which hosts a growing library of educational games and puzzles. Our target users are primary school students, who will have the ability to play a number of interactive games via our website or via our Android and iPhone apps.

Our goal is to help improve young student with their learning skills, complementing what they are taught in school. Other than having entertainment value, problem-solving games have been shown to improve users cognitive, social, mathematical and problem-solving skills.

The gamification of the system will push students to improve their skills as more levels and different types of games become available the more the students use the site/app. Additionally the puzzles will update each year as the student progresses with school to reflect the studies the student will undertake in that school year.

All information stored about the student is de-identified with the user only needing to enter the student's year of birth, school year and state and create a username tied to a parent's email address. An option will be available for the parent to receive a monthly report of their child's activity, which may include the following metrics:

- Hours the student has used the program
- The student's progress
- Where our algorithms have determined the student is above or below our average user for that student's age, year level and state,
- Possible tips to discuss with the student teachers on what areas the student might need support with and tips to help parents at home with these areas.

In the future we hope to align with primary schools to better reflect their teaching goals for students and customise the release of games to their class schedule. We may also provide metrics to the school in the future with parent's consent.

Eventually we hope to have a revenue stream from the Education Departments and schools, however initially we will need revenue from a combination of advertising and pay for use models. We will have a free version of the app/website access, with basic games, advertising and no metrics available. We will also have either a subscription model or a paid app model to access the full suite of games and metrics.

Mindgames will also offer more advanced options for a premium. These advanced options will offer parents the option to tailor their child's games to focus on areas they feel their child need help with, with more powerful suggestions of where the student should focus provided by our machine learning algorithms. Parent's will also be able to setup mini goals for their kids (based on completion of games or time spent). These goals may even involve unlocking other apps on the phone/tablet (such as Youtube kids or ABC kids iView) for a certain amount of time as a reward.

The games themselves will be initially provided in-house with options of other providers to provide their own games, hosted by Mindgames. Mindgames will pay the other providers a royalty but the hosting will be reviewed twice annually and unproductive or unpopular games may be dropped.

Our Group Feedback

Working together on this report and launching our website we had the following feedback;

Andrew Waltos' feedback;

The group worked very well together for this assignment. Everyone was eager and happy to work on different aspects. Michael took charge by showing great leadership and organization to set up canvas chat topics and Microsoft Teams channels. His direction made it clear and easy for all of us to get the required work done. His experience in web design made Peter a great choice for hosting the GitHub page and building a website frame. him. Dylan, Kaleb, Michael and I wrote reports on IT Tech and sent these through in MS Teams. As we all have differing schedules and availabilities, we could improve a little on communication by organizing a dedicated sit down where we all can have input on who does what perhaps via a scheduled Discord chat. I was quite surprised by how well MS Teams works - very easy and clear in regard to setting up channels and uploading files for other members to review. I learnt that team work is a very efficient way of getting work done by allocating tasks to suit people's strengths. The GitHub log will show accurately who changed and added content to the website but does not show behind the scenes work or organizing and individual efforts in report writing.

Dylan Moore's feedback;

For a group that is connected through an application to share our ideas and thoughts, I believe we were effective and well organised. We had a reliable professional leader that helped keep the project on track and keep us up to date with our daily tasks. The work was divided up evenly to make it much easier for us to finish before the assignment due date. We were open to any ideas that would benefit the project and our team. For our communication we didn't discuss over audio meetings but mainly just by writing on Microsoft teams and discord. Michael had created specific topic pages that were linked to our project, then we all contributed all our ideas and finished tasks into that folder in Microsoft Teams. All of the team members were very responsible and reliable, and it was easy to communicate with everyone and express new ideas. Learning from this experience only leaves a positive feedback for me, and for our next Assignment I believe it would be even more beneficial to have a group online meetings, video chats to facilitate our communication even more and have a set online meeting at a particular time. Overall I'm very impressed with our team.

Kaleb Tomaszek's feedback;

As a group, we quickly divided up the work and had a leader established to help make overall decisions. We were able to deduce who was the most confident creating and using Github repositories and therefore who would host our site. When assigned tasks, we all completed them without requiring assistance from each other which gave a lot more time for everyone to go over what they had written to perfect the information before it was collaborated. What could have been improved may be the overall organization of our team. We did not require team meetings to complete this task and relied upon everyone doing their part within the bounds of their own available time. We could have most definitely proposed to hold meetings so as to discuss all information, so that everyone understood all content of the report, rather than all understanding their own information and just putting the rest together on a report. I was surprised by how fast all the IT technology reports were completed, and I learned that in a group, many things can be researched at once and summarized in order for all members to gain the knowledge that one had located. Our Github log will not so accurately represent the work completed by each member for assessment 2 as all info for the assessment was submitted to Microsoft teams and not all members were required to access or manipulate the repository.

Michael Hayes' feedback;

Overall, I think the team functioned very well in compiling this report and our team website. Our team is graphically quite dispersed, with the team spread over 3 time zones for the majority of the duration of this assignment.

I think dividing up the work (with 4 of us completing the tech write-ups and 1 doing both the interview and creating the website page template), worked well. *(note: one initial team member was not involved, despite repeated attempts at contacting him over the report period)*. Also having everyone check over the report before the submission also worked.

I think our decision making was great for the most part, however making a final decision on which project took longer than what it should off. Also we didn't have a time where all five members of the group where in the chat at the one time, something I think we will need to fix going forward with the next assignment (have a group chat in our MS Team or a voice chat on discord at the start, maybe one during and one towards the end).

I was surprised about how effective we were in using the tools within MS Teams, as it was the first time for all the members to use that software and was really happy that everyone in the team was able to contribute fairly evenly.

I learned that the team seem to be positive to having regular summaries of where we were at as a team and what was left to be completed. I was concerned that it might frustrate the team members, but the responses were all the opposite.

Personally, I feel the Github commit trail on its own will not be a completely accurate representation of the group/individual efforts as a lot of work was placed directly into this report and done via our MS Team pages.

Peter Goodwin's feedback;

As a Group, we worked well together. Work was evenly spread, and our communication was excellent. Our Teammate Michael broke a complex task into manageable group chats, where we all talked about the roles we would like to work on. Michael was very clear to understand and easy going, which created a comfortable environment for our creativity to show. Andrew broke down the benefits of small computing devices, his report was very informative, I agree that soon every home will have a 3D printer and the benefits are astounding. Dylan wrote about Cybersecurity It was very interesting to know just how much we rely on Cybersecurity for internet banking.

Michael, Kaleb, and Andrew all wrote on IT Technologies. I worked on a website on GitHub, created links for group profiles and hosted it on my GitHub repository.

All reports were well written and researched. Some areas that could have been improved where perhaps an organised group chat, all at the same time. As I'm sure we all have other obligations, a group sit down once a week would have been more helpful in organising what everyone was up to date on, and what we need to work on. Overall my experience was pretty smooth with no big hiccups.

Project Extension's overall feedback;

Overall, based on the individual feedbacks (listed above) and chats during the assignment, the group feedback is very positive. This is surprising in one way, given the geographic spread of the team, it was our first time working together and no team member was familiar with MS Teams (our main communication method). This bodes well for the next assignment as each team member is now familiar with each other now (and each member's strengths and weaknesses and level of knowledge/areas of interest).

Using MS Teams worked really well, as we were able to break down the assignment into various parts (and then into channels). Although the chat function was not utilised effectively until near the end of report completion. We also used Discord to chat (as an additional discussion board). Universally the team felt we could have better used Discord and organised more group voice chats. This will be the major aim to improve in communication in the next assignment to organise more group chats (probably on Discord) using a combination of voice and text that Discord provides. We will need to organise a chat near the start and possibly regular chats during the assignment, along with the MS Teams posts. By the end of the assignment everyone was also able to access the group report doc file for checking and contribution.

Everyone was able to contribute during the assignment, with the division of labour fairly evenly spread. Everyone was able to provide their profile paragraphs (which they individually uploaded to the group page). Individually each member also completed their industry data sections and feedbacks. The remaining of the work was split between the 5 members with:

- Peter completing the IT Interview as well as designing/building the website and pages,
- Andrew completed the IT Technology “write up” on small computer devices,
- Dylan completed the IT Technology “write up” on cybersecurity,
- Kaleb completed the IT Technology “write up” on natural language processors,
- And Michael completed the IT Technology “write up” on Machine Learning and compiled the report,
- With everybody performing final reviews of the document and website.

Overall the team believed the group dynamics worked well and everyone contributed. The team felt Michael took on a leadership role with his organisation of the various channels and with regular updates of the team progress, which seems to have been appreciated by the team members.

Ultimately the team felt that through-out this assignment, the team worked well together and everyone contributed (other than our MIA member Scott), because of this we were able to achieve this report and related website to a high standard. The team looks forward to facing the next assignment together.