Natural Language processing (NLP) and chatterbots

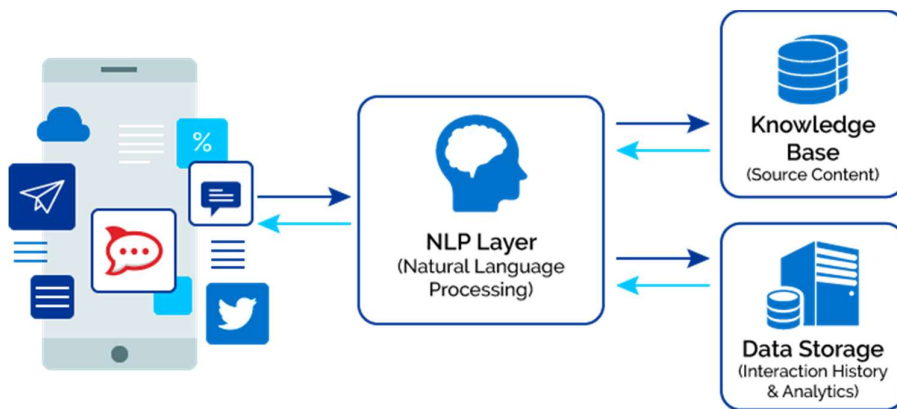## Background

There are many Information Technologies and they take different forms. These all relate to a computer's interactions with the user and other computers. Looking a current area which deals with Natural Languages processing and chatterbots. What do they do? To say what they do we need to understand what they are.

Natural Language process (NLP) is how a computer which is a machine is programmed to think like humans. The machine then uses this knowledge to communicate with the human, in a method which is easily understood by them. NLP is a simply a complicated computer interface between the user and machine. The aim is to have the computer think as much as possible like a human, enabling it to understand what the human is saying, thinking or may do. With this gained knowledge the computer gives the outcome as if it was a human. How good a NLP is, since the 1950's has been gauged by The Turning Test which was developed by English mathematician Alan M Turning to determine if a computer program can think.

Traditionally NLP have developed techniques which used theories, which have used a set of algorithms to process the language spoken by people when using computers. Historically NLP was based on Basic Grammar patterns which were called LISP systems. This transformed to "prologue" logic programming which based solutions on concepts, based on oral language structure. It used parse tree to find solution to questions. Currently many are based on "Neural nets". These are artificial neural networks which were the computer system models the human brain and nervous system to determine solutions by establishing pattern for the user. When you think NLP think artificial intelligence.
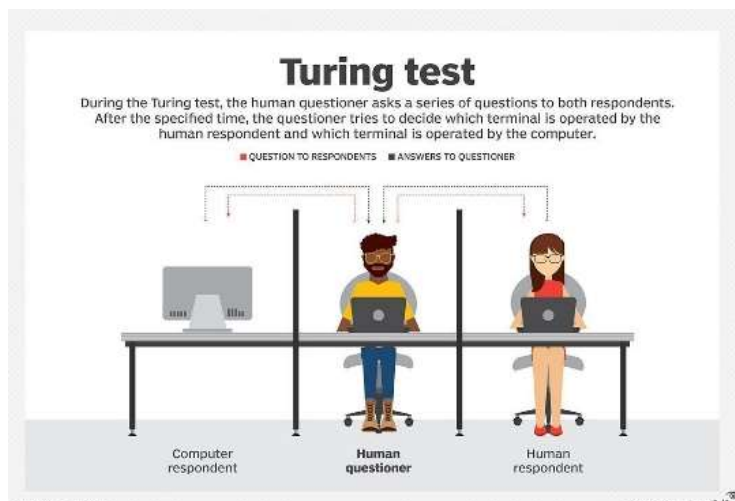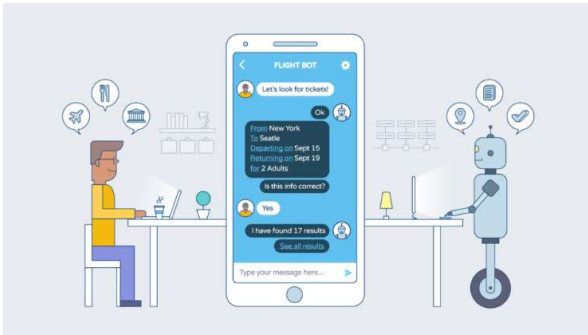
Chatterbots

Chatterbots is currently one of the most common forms of Natural Processing language user interfaces. They allow you to look, obtain and share all kinds of information with the use of an IT device in a human like interface. Chatterbots also called chatbot are user application programs which as the name suggests communicates with the user through conversation using various inputs. Examples are text to text, speech to text, speech to speech, facial expression to text/speech etc. Chatterbots are used for messages and aim to mimic a human, to obtain information from the users and give feedback on this information. They are inbuilt to most IT devices without the user aware of them, for example Siri, hey google, dictation tools, spell and grammar checks etc. These programs regulate previous gained information in convoluted manner which to the user, seems like intelligent talking. They get words from the user transform these words into a pattern which the machine can understand, then process it and give an output in another word pattern which sounds like they are talking back to the user, given feedback to their input.

They are used in many fields which involve mondain human contact, such as tradition call centres, medicine, government, entertainment, and business. They are used in business to help give or obtain information to customers, to free up humans. Users can give their orders, problems, and feedback to a chatbot. Eg a user has a problem with their mobile phone service. They are prompted to give their account details by the machine. The machine then uses this information to locate their database. The machine can then give automatic responses, then try and solve the problem eg reset, turn off/on. The machine then uses knowledge base. This was what it was initially program for, along with what it has built from previous user interaction. It completes, if /when scenarios to try and solve the user's problem. The interaction continues once the problem is solved, or the task is too complicated for the bots programming and the bot refers the user to a human.

With the speed of advancement in the IT industry in the past few years mean many current form of chatbot which are currently being used have been partly superseded. During the current pandemic and shift to online shopping NLP have been used to help customers with their shopping. They help establish list and prompts shopper of add on purchases. They also can use an inputted imagine along with measurements to show what the products may look like on the intended users, likewise this can be done with household item to show what they installed in the user house

HOW AN A.I. CHATBOT WORKS

Input from a user → Analyze user's request → Identify intent and entities → Compose reply

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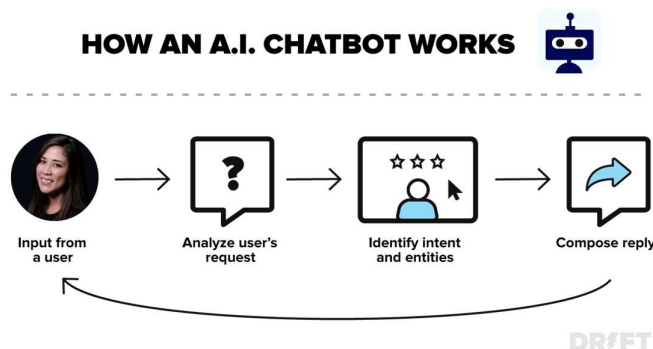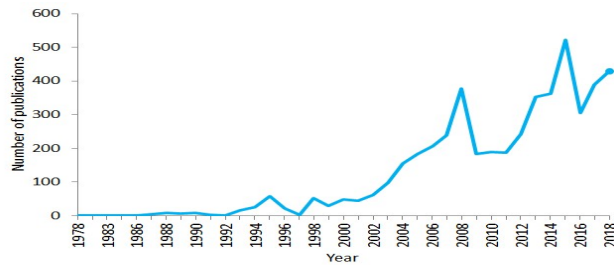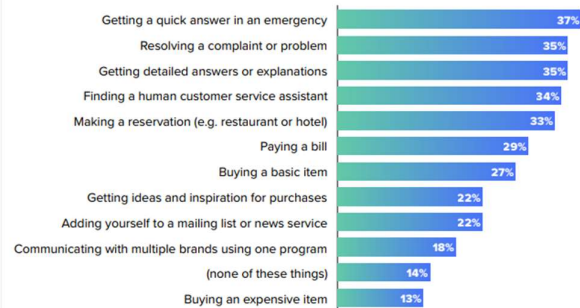
Direction and effect of Natural Language processing (NLP)

With the boom in IT, there is more money available for investment in research and development in NLP. The below right graph reflects the past 40 years, development and implementation of this technology. In recent years there has been massive in growth. The table on the left shows predicted uses for chatbots.

Predicted Use Cases for Chatbots
What do you predict you would use a chatbot for?

Use	Percentage
Getting a quick answer in an emergency	37%
Resolving a complaint or problem	35%
Getting detailed answers or explanations	35%
Finding a human customer service assistant	34%
Making a reservation (e.g. restaurant or hotel)	33%
Paying a bill	29%
Buying a basic item	27%
Getting ideas and inspiration for purchases	22%
Adding yourself to a mailing list or news service	22%
Communicating with multiple brands using one program	18%
(none of these things)	14%
Buying an expensive item	13%

Graph: Number of publications containing the sentence "natural language processing" in PubMed in the period 1978–2018. As of 2018, PubMed comprised more than 29 million citations for biomedical literature

image source left: https://www.revechat.com/wp-content/uploads/2019/09/predicted-use-cases-of-chatbots-1.png
image source: above right https://miro.medium.com/max/960/1*CGHaWd635jtRa47n4nhsiQ.png

In the next three years NPL is likely to move from server side to edge based technologies such as those being developed by Brainchip ™ and Neuralink ™. These designs are aimed to mimic brain functioning. They will one day read brain signals via a wireless minicomputer chips. Then transform this collected data into unsalable knowledge and tasks of the users.

In Australia all government agencies, power and telecommunication along with other consumer companies have been using NPL in some form. All customers have been exposed to this interface directly and indirectly.   The impact has been both good and bad for the user.

The future paths are still very clouded. I could predict in the next few years it may advance more to be developed into an interface, overcoming the current frustration and short fall uses may have with it. It may also plateau due to it becoming obsolete as it is replaced by other Artificial intelligence development such as BrainChip ™.

Due to the amount which has been invested in chatbots, it highly likely they will be fine tuned. Existing businesses will make improvement to maintain their chatbots. This will continue to improve our everyday lives access to information and the associated cost. If Brainchip ™ or the likes are developed enough to be commercially viable in the next three year, and marketed correctly then the impacts astronomical. Eg with the Brainchip ™, the user just has to think to turn on the lights.
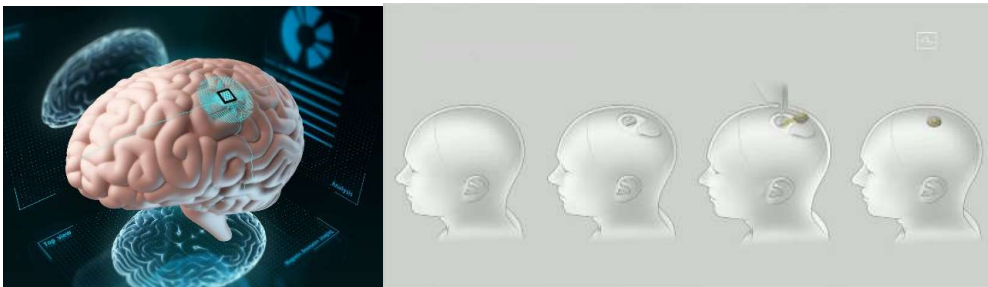
The potential impact of this development is both good and bad. If chatbot continue to be developed at the current rate, there will be a lot more bots. This would help companies save money and users the enhancement of information access in any 24/7 time frame. Integration and assimilation of people working and living in different time zones and countries will improve. The negative would be human to human contact would be greatly reduced. It likely will increase scammers use to get vulnerable people scammed via telephone or internet. The amount of internet junk will also increase.

Many people will be able to access and give information with greater ease, informs they can relate to. Many of the existing call centres will close with jobs losses. Very little IT jobs will be created as NLP will be cheap to maintain. Scam callers will also become redundant. You can run a lot more scams at once because you can have one bot do the work of many. Retail employees will also be reduced, with increased buying opinions.   As the NLP will also replace some marketing jobs, as an algorithm will determine what adds they see when integrating with technology.

Personal Effect

NPL advances are likely to affect my friends, my family and myself in the same way. If I think of my daily life how will NPL effect how I live in the future. This would depend on how much money I have available to access the technologies. In general terms it would effect me in the different ways, how I access goods and services examples would be;

- Obtain money from the bank. Society will become more cashless, physical money will be phased out. Currently due to the pandemic many places have stop excepting money and only electronic transfers. The bank teller will disappear, along with many ATM, bank customer service will be chatbots.
- Postal service will change, letters will not be sent, but parcels will increase for NLP sales.
- Shopping my shopping will be likely to be more automated with the system being able to predict what I need to buy. Programs will be able to source the cheapest prices for item which I need.
- Public transport will become partly automated. Some driverless vehicles will be phased in. Fare systems would be control via picking up app signals rather than physical cards.
- In my house there will be an increase in devices which can be controlled by NLP. Eg voice control appliances. What will be different for you? How might this affect members of your family or your friends?
- In interaction some of my friends could be controlled virtual with NPL. Vetting and monitoring of them could happen (Big Brother). Establishment of compatible matches based personalities. I could have conversation with virtual people.
- Jobs structures and descriptions will change slightly, you may be able to do less hours by getting your Artificial Intelligent device to help you.
- NLP could also help with increase finances with being able to predict the investment markets and how to save based on altering spending patterns.
- Medical services may be affected. You may have to go to a chatbot before you obtain medical or phycological services.
- Filtering chatbot can remove freedom of speech and filter out any comments made which be offensive to others. Resilience programs could also be obtained.
- Movies could scripts written by chatbots by them sampling other scripts about the same genre. These could also be dubbed into any language requested by the viewer.
- Novels and stories could be personal created by chatbot for the intend audiences again based on sample of previous novels liked by the audience.
- In education chat bot could help in developing a program to deliver the required use curriculum. Curriculum and lesson could be personally targeted to the needs of the students. Eg a chatbot could do an individual learning plan for each student in the class. In other words a chatbot would be replacing the teacher's aides. If a teacher wished to teach a topic, a chatbox could research the topic and produce handout for the students.
- A downside is student or employee could have a chatbox do their task for them. Online tests could be done by a chatbox. A plus would be a brainchip™ would eliminate this to a certain extent.

Left: Human Brain with implanted chip source: https://mindmatters.ai/wp-content/uploads/sites/2/2020/09/human-brain-with-an-implanted-chip-stockpack-adobe-stock-1597x1198.jpg
Centre: Neuralink brain design Source: https://singularityhub.com/wp-content/uploads/2020/09/Neuralink-update-1068x601.jpg right

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