**Natural language processing**

**I. Definition and a little history**

The initial definition of “Natural language processing” can be considered as another area of computing extended from linguistic, computer science and artificial intelligence which goes into the interaction between machines and the human language. Particularly in how to program a computer so that it could understand and process natural language

This fundamentals of this particular area in IT dates all the way back from the 1950s, when Alan Turing published an article titled “Computing machinery and intelligence”, introducing the whole concept to the public with one question “Can machines think?”, resulting to what we know today as the “Turing test”

**II. Main content**

*What does Natural language processing do and its relations to chatterbots*

Initially, you could think traditional Rule-based bots that only rely on option buttons, yes-no questions, keyword recognition, and quick answer suggestions can already generate exceptional answers to human’s question, but NLP (natural language processing) still pays an important role in the matrix of bots development.\

**A: The way NLP works**

To explain what NLP is, we can take the example of one of its very famous uses, which is the auto-correcting system found in almost every devices that you use to type words on, especially documenting and texting. This kind of software not just identify and correct the mistakes you make while typing, it can also predict or guess which words you want to type in next. This is achieved by giving the software a massive library of information and data about the language that we use, words, phrases, different sentences or even live transcripts of conversations or emails. And with this overtime, the machine itself could learn how to assemble the words together into meaningful sentences, and make sense of what we’re trying to deliver. But, all that is of course still much more simple than being able to naturally respond to a conversation with a human being.

Despite that, a computer’s understanding of natural language happens through the analysis of text or speech input using a hierarchy of classification models:

**+ Domain classifier**: divide a human’s input into sections into a pre-set group of conversational domains. This particular solution is only necessary for processing a conversation in which contains various different topics, each needing specialized vocabulary. One famous example of the ability to classify domains being essential for an AI is the virtual assistant Cortana of Microsoft. Domain classifiers seen from assistants such as Cortana are likely to include the weather, news, music and many others.

+ **Intent classifier:** exactly as its name suggests, it identifies the person's goal by assigning each input to one of the intents defined in your NLP system. These usually include “find the nearest store”, “find opening hours” and so on.

+ **Entity Recognizer:** acquire the data which are essential to achieving the user’s query/intent. For example, if the user wanted to book a flight, the required information under this intent would be the flight time, date or luggage.

+ **Role classifiers: are additional labels that you may attach to your entities to even further differentiate them if needed, such as classifying the time even more by labeling it as morning or afternoon.**

**Now with all that about the way NLP works, we can finally dive into the major factors that helps NLP based chatbots a reality.**

**B: The 3 Pillars of an NLP-based chatbot**

1) Dialog system

As far as communication goes, us humans use the very tools that the natural evolution has gave us for thousands of years, our mouths to speak, our ears to listen, our fingers to type and our eyes to read. Obviously, chatbots will need an appropriate interface that is compatible with the way humans retrieve and give information through communicating. Which is what exactly called a Dialog system.

For such system to actually work as it intends to, it has to be proficient of producing output and receive input. Other than that, they can acquire a variety of forms. You can differentiate them based on:

* Modality (text-based, speech-based, graphical or mixed)
* Device
* Style (command-based, menu-driven and - of course - natural language)
* Initiative (system, user, or mixed)

2) Natural Language Understanding

It is essential to point out that the ability for bots to interpret what the user is saying is still one of the, if not the biggest weakness of an NLP based chatbot. Due to the immense complexity of the human language, the massive vocabulary along with words that has multiple meanings that are completely different from each other.

Therefore getting the NLU (natural language understanding) right on these bots are much more important than making them sound as human-like as possible because in the end, the user could care less about the ecstatic of the software when it produces the answers they need. Nobody will notice if a bot can't deduce meaning from natural input effectively, even if it has the smoothest small conversation abilities.

3) Natural Language Generation

Now that after a bot has got a decent understanding of whatever the input is given by the user, they got to be able to produce an appropriate response and translating it into human language, which requires NLG (Natural Language Generation).

The framework of the material must be established for the NLP to generate a human-friendly narrative, whether through rules-based workflows, templates, or intent-driven techniques. To put it another way, the bot needs something to work with in order to produce that output.

As of today, almost every NGL system relies heavily on narrative design, aka conversation design which is a synthesis of many design disciplines including voice user interface design, interaction design, visual design, motion design, sound design, and UX writing to produce an output.

***What is the likely impact that NLP and chatterbots would have on the development of technology?***

**In recent times, many would argue that NLP based chatbot would be completely unnecessary considering its practicality when it comes to improving a businesses for say, because simple and straightforward tasks only needed to be done by the press of a single click hence why it is not needed to make the user type out or say what they want. For a matter of fact, if used inappropriately, chatbots could hurt one’s business more than doing any good.**

**So using chatbots for anything rather than messing around for entertainment such as “Eve” is not going to be really any better than seeing and talking to an actual human employee to get support.**

**Needless to say, despite that I still think further developing this kind of technology would be extremely fascinating, since technically modern day chatbots can already convey very meaningful conversations with a human being and even with each other, it may not be practical yet but with it still growing each day, perhaps service jobs could be replaced by bots that can converse with people just fine, ensuring the satisfaction of the customer. The possibilities are actually much more if you use your imagination enough.**