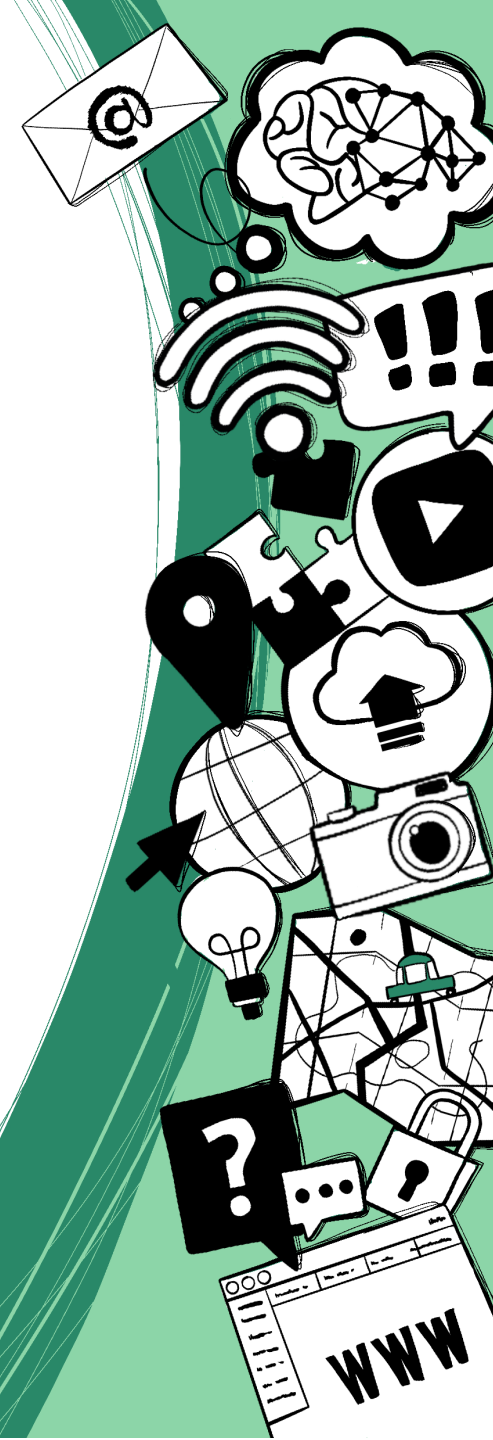
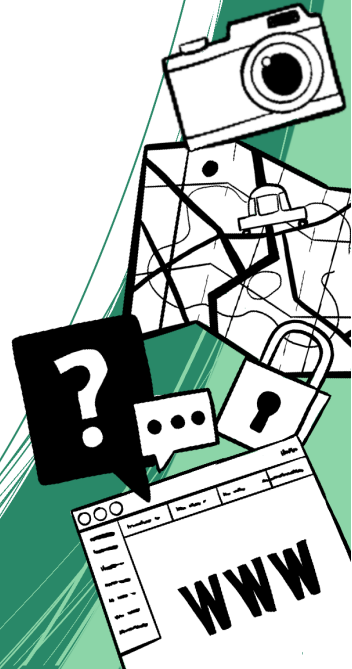


Creating a NLP-Based Chatbot



How does a NLP-Chatbot work?

- **Language Processing (NLP) Chatbot:** needs verbal input using the keyboard or saying it out loud
- The bot analyzes the words and turns them into information.
- It consists of:
 - understanding the human language: **Natural Language Understanding (NLU)**
 - creating the language: **Natural Language Generation (NLG)**

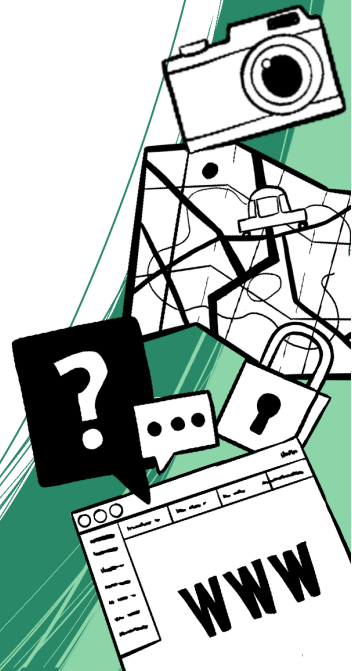


How does a NLP-Chatbot work?

- The Chatbot has **no knowledge of the meaning of the words**

To a Chatbot this is pretty much the same:

- „I want to make an appointment for a haircut“
- „mis sdaijhw wek“

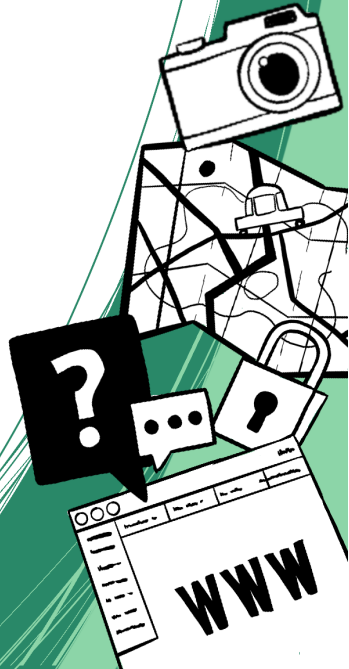


How does a NLP-Chatbot work?

- Chatbot receives human input
- The Chatbot starts a **step-by-step process** where it tries to find necessary structures

Example

„I want to make an appointment for a haircut“



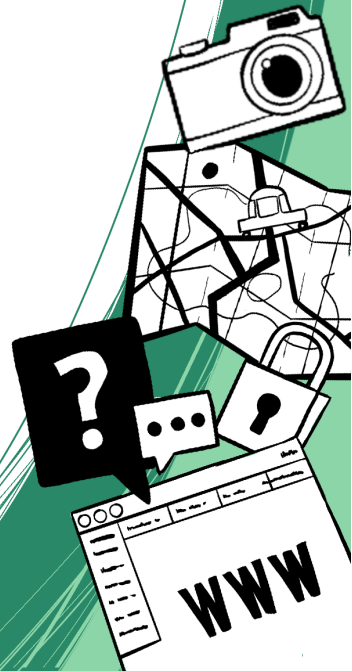
How does a NLP-Chatbot work?

Phase I: **Tokenization**

- recognizing the **boundaries of the sentences and words**
- Computer doesn't know what a word is

Example

```
"I", "want", "to", "make", "an",  
"appointment", "for", "a", "haircut"
```



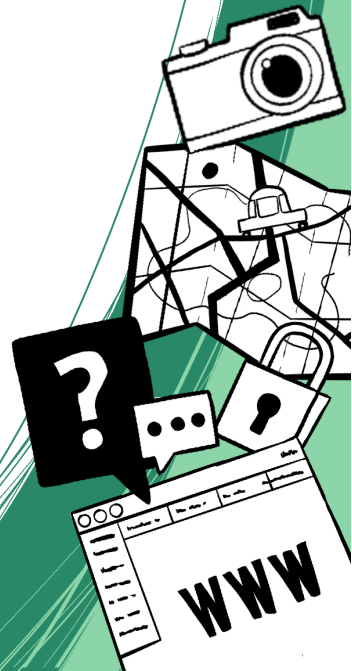
How does a NLP-Chatbot work?

Phase 2: **Lemmatization**

- Chatbot has to find the basic form of the words
- Word endings don't change the main meaning of request

Example

„I“, „want“, „make“, „appointment“, „for“,
„haircut“



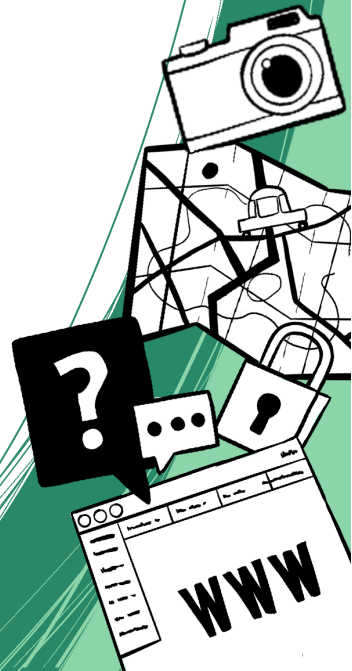
How does a NLP-Chatbot work?

Phase 3: **part of speech (Pos) tagging**

- **nouns and verbs** are usually more important for the rough meaning of a sentence
- Determining the parts of speech as preparation for the next phase

Example

„personal pronouns“, „verb“, „verb“, „noun“,
„preposition“, „noun“



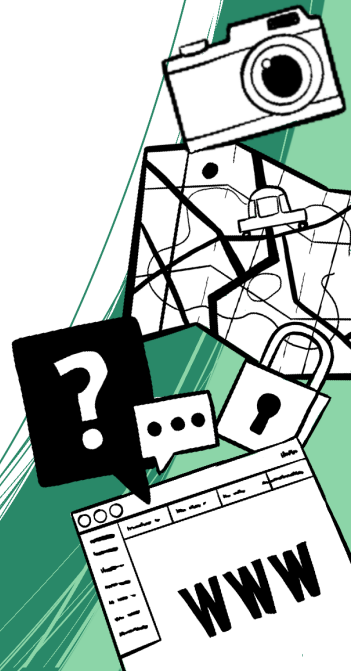
How does a NLP-Chatbot work?

Phase 4: **Syntax Analysis**

- **recognition** of subject, object and verb (to cover the most meaningful parts of the sentence)
- creates a model of **the dependencies of the words**

Example

Subject = „I“, transitive verb = „make“,
object = „appointment“, object = „haircut“



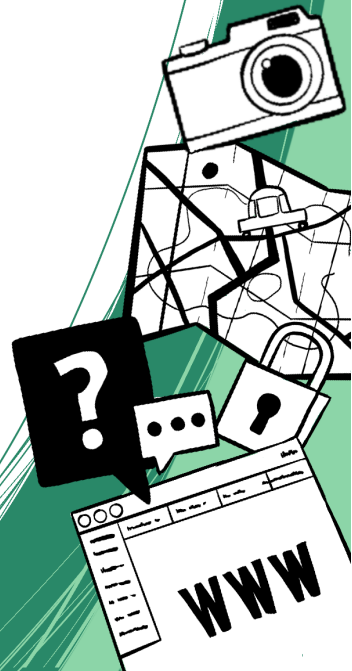
How does a NLP-Chatbot work?

Phase 5: **Semantic Analysis**

- Programme doesn't really know what words *mean*
- Giving the programme a list with possible keywords and answers
- Chatbot compares the keywords with the list and gives the correct output

Example

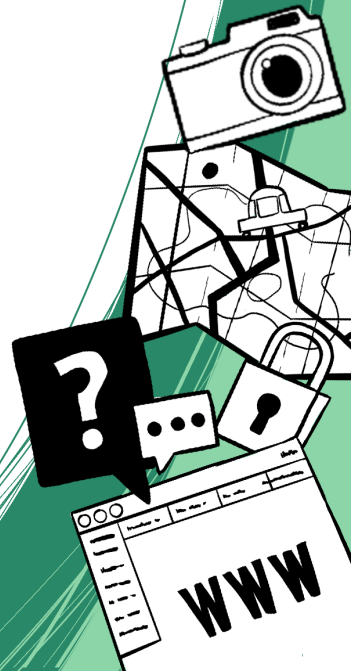
Intention: „make appointment“, Object:
„haircut“



Exercise: Build a Paper-Chatbot

Have a conversation with the paper chatbot!

- One student is the **user**, another student takes on the role of the **chatbot**
- The student who plays the human user wants to make an appointment at the hairdresser's and **writes the request on a piece of paper**
- The human chatbot now goes through this sentence and picks out the important **keywords** by **comparing** the words with its **table**.
- The chatbot can **answer** using the keywords it finds on the table.
- If the human chatbot does **not find any keywords** on the table, an appropriate answer must be selected.



Additional Tasks

- Try to book an appointment at the hairdresser with this table! Do you manage it or do you have problems? How do you have to complete the table so that you can have a smooth conversation?
- What happens if a negation is made by a customer? (e.g., I do NOT want any more appointments)
- Imagine a customer who has a complaint because his appointment was lost, or his hair was cut wrongly and is now upset. How could the bot know that the customer is angry? How should the chatbot react to insults?
- What would have to be done to make the chatbot more authentic? How do you think he could pass a turing test?

