

Voice Assistance

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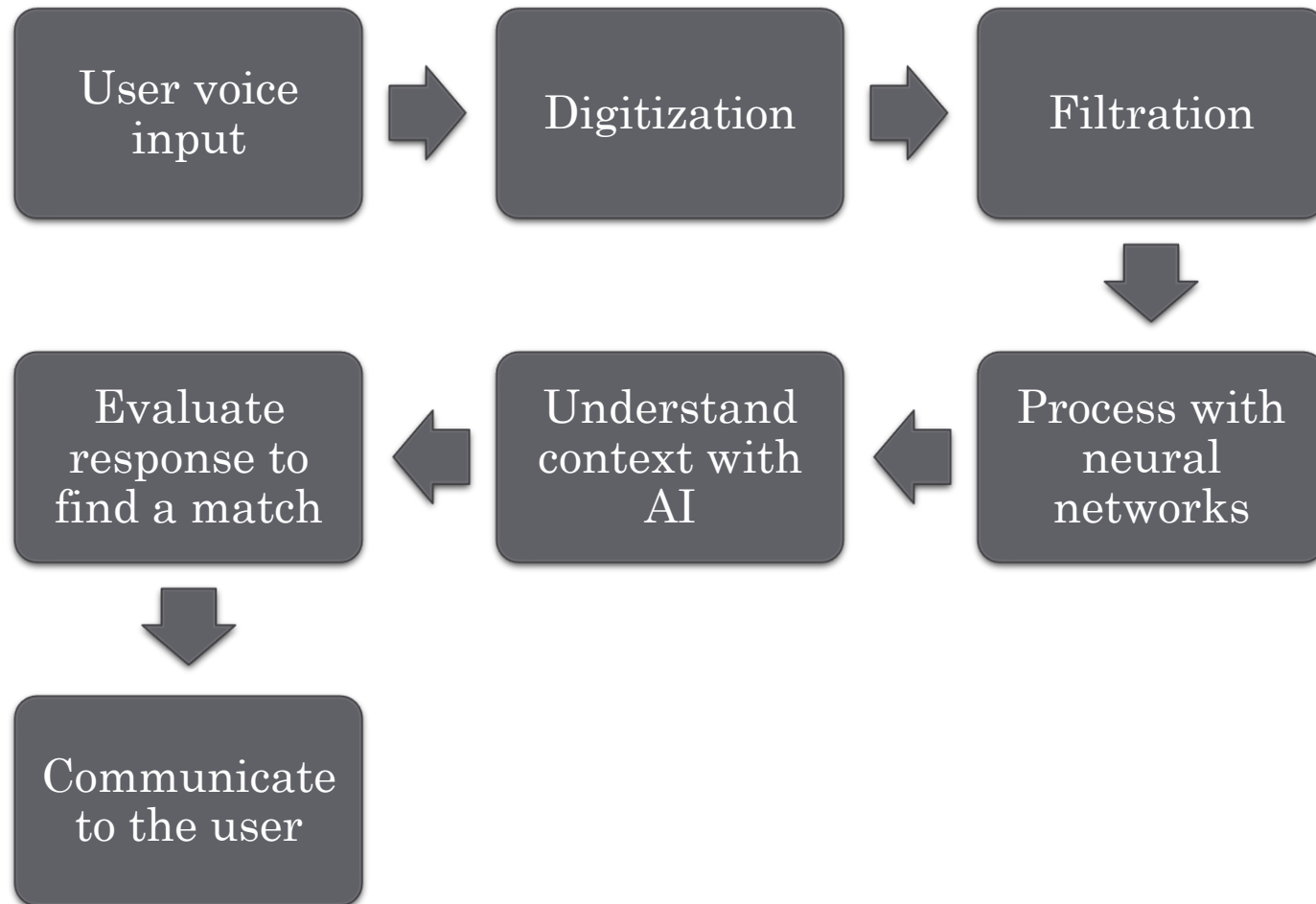
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What is Voice Assistance?

- A Voice Assistance is a user interface that pays attention to voice commands of user and performs particular tasks via **Voice Recognition, Speech Synthesis, and Natural Language Processing (NLP)**.
- Some of the most popular voice assistants today are:
 - Google Assistant
 - Amazon Alexa
 - Apple Siri
 - Samsung Bixby
 - Microsoft Cortana

How does Voice Assistant work?



The Algorithms behind it

Natural Language Processing (NLP)

Hidden Markov Models (HMM)

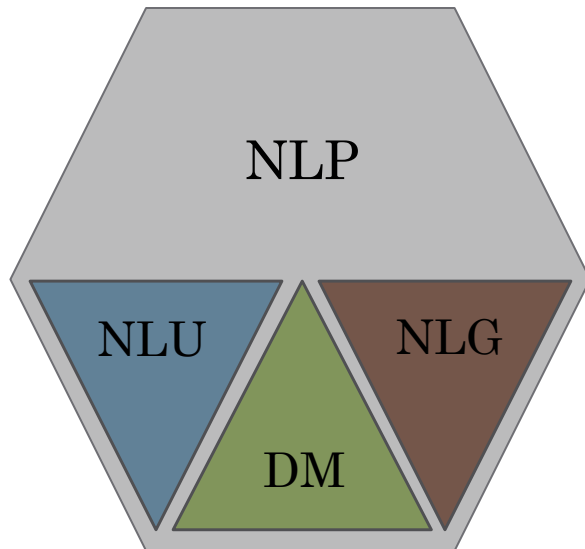
Artificial Neural Network (ANN)

N-grams

Speaker Diarization (SD)

Natural Language Processing (NLP)

- NLP helps machines and applications to understand the intent of human language inputs, and then generate appropriate responses, resulting in a natural conversational flow.
- It combines computational linguistics – rule-based modeling of human language – with statistical, machine learning, and deep learning models.



Natural Language Understanding (**NLU**)

- Interprets intent behind input

Dialog Management (**DM**)

- Deciphers intent and categorizes response based on business rules

Natural Language Generation (**NLG**)

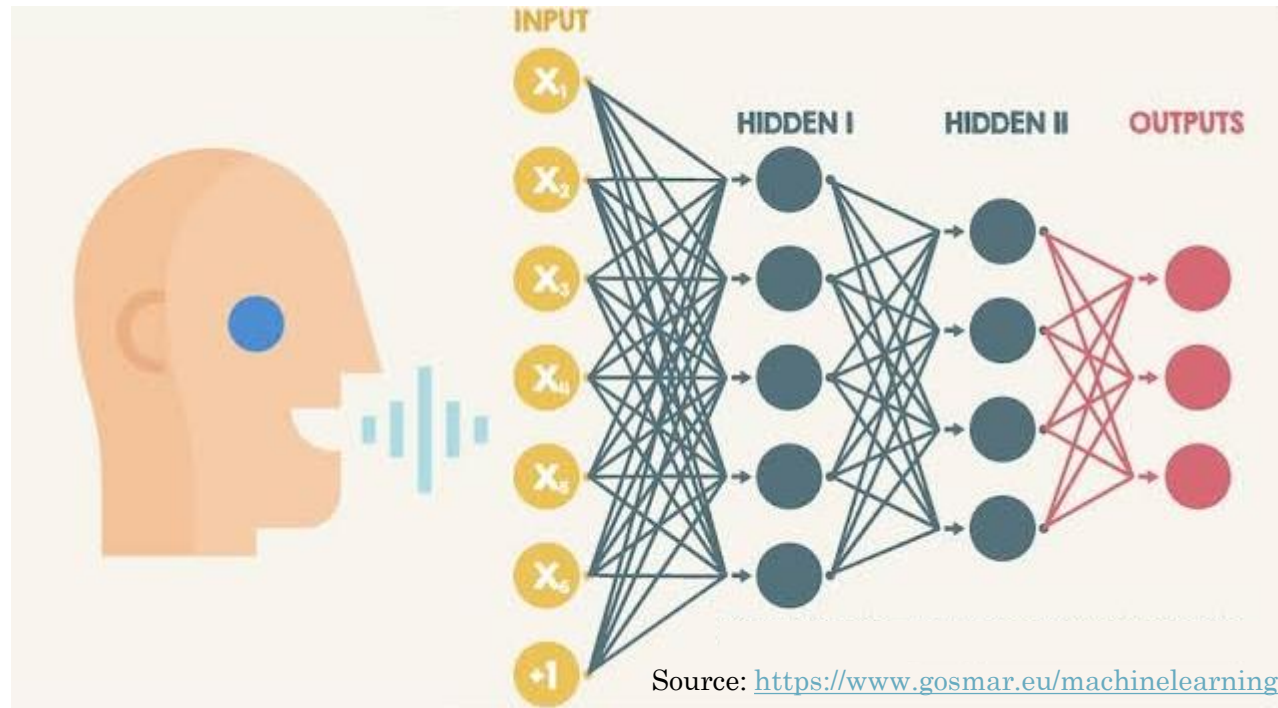
- Forms appropriate response

Hidden Markov Model (HMM)

- Arranges phonemes in the right order by using statistical probabilities.
- To do this, it uses three different layers.
- **First Layer:** The model checks the acoustic level and the probability that the phoneme it has detected is the correct one.
- **Second Layer:** The model checks phonemes that are next to each other and the probability that they should be next to each other.
- **Third Layer:** The model checks the probability if two words should be next to each other and reaches to the conclusion whether those words next to each other makes any sense or not.

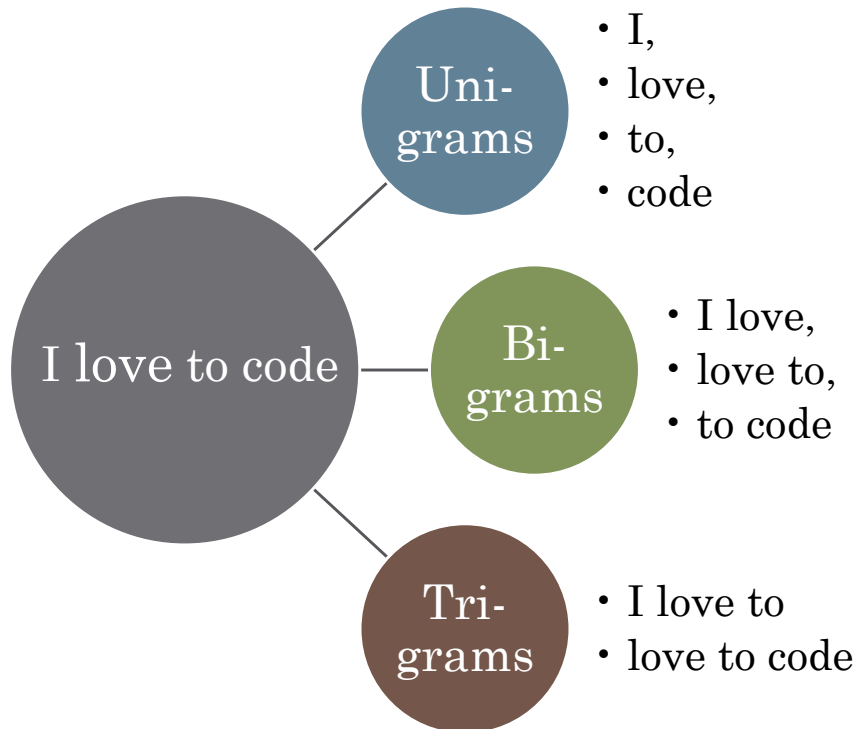
Artificial Neural Network (ANN)

- The inner working of artificial neural network replicates the biological neuron system of human brain.
- It is a network of nodes that are built using an input layer, a hidden layer composed of many different layers and an output layer.



N-Grams

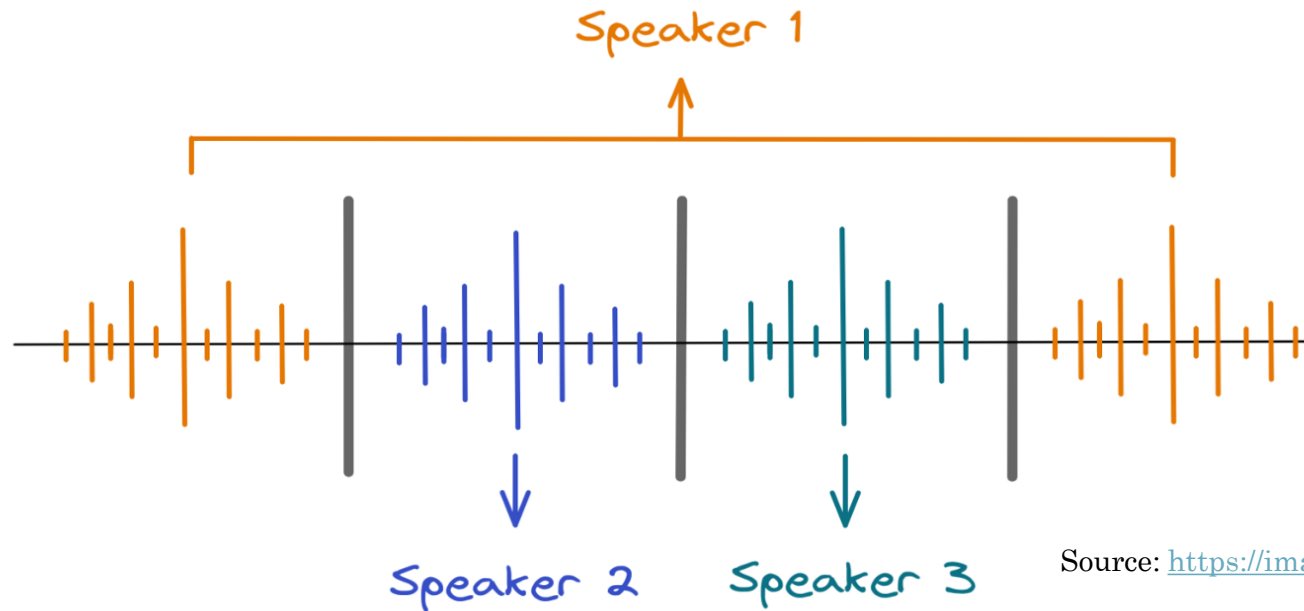
- Contiguous sequence of 'n' items form a given sample text.



- By using N-grams we can find the probability of certain word sequences to improve recognition and accuracy.
- Example:
 - She likes fairy **Tales**.
 - The dog wags his **Tail**.
- Here both **Tales** and **Tail** sounds similar, so we use N-grams to predict the suitable word based on the context.

Speaker Diarization (SD)

- Speaker Diarization is the process of partitioning an input audio stream into homogeneous segments according to speaker identity.
- This helps programs better distinguish individuals in a conversation.



Source: <https://images.app.goo.gl/8qHdj6t82Bv6yPudA>

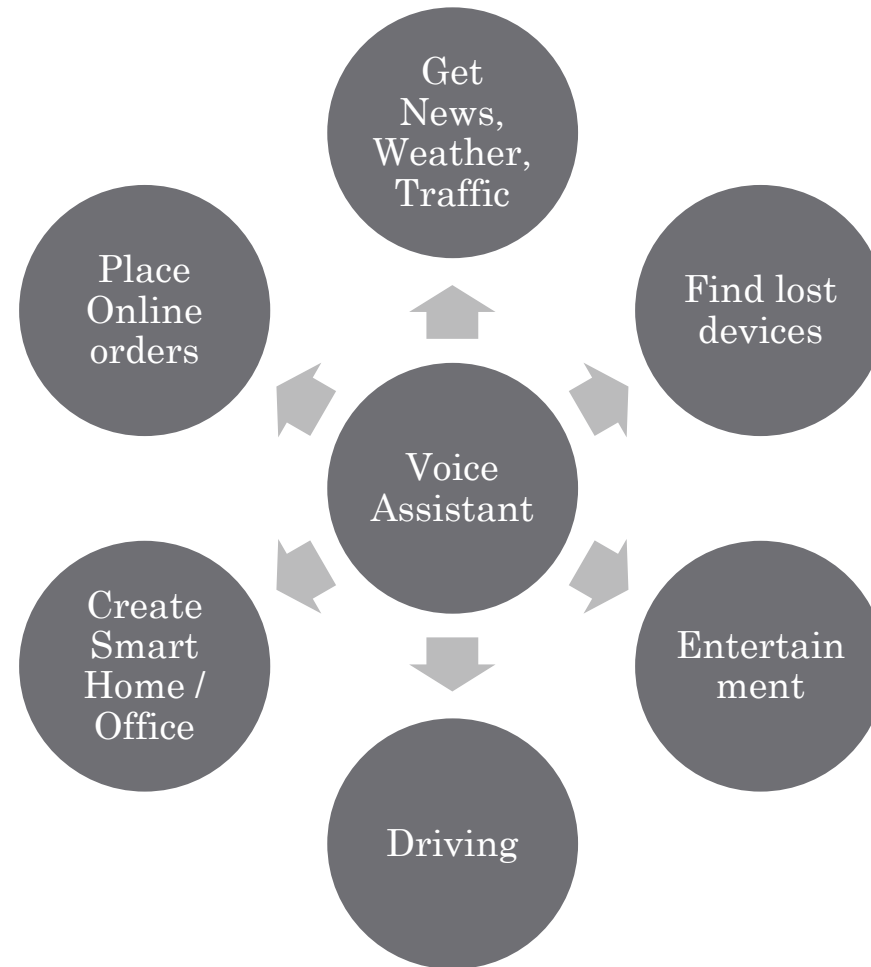
History

- 1950s: **Audrey**
 - Capable of recognizing digits with 90% accuracy.
 - By Bell Laboratories
- 1960s: **IBM Shoebox**
 - Capable of interpreting 16 English words
- 1970s: **Harpy**
 - With a vocabulary of 1011 words, Harpy understood entire sentences and recognized boundaries of individual words.
 - By University of Carnegie Mellon
- 1980s: **IBM Tangora**
 - Capable of predicting the most probable outcome based on what it analyzed previously.
 - Using **Hidden Markov Model**

History (cont..)

- 1990s: **Dragon Naturally Speaking**
 - The first affordable speech recognition software, available to general public.
 - Capable of recognizing and transcribing natural speech without pauses between words.
- 2010s: **IBM Watson**
 - The first system, capable of processing natural language with the same speed and confidence as a human.
- 2011: **Apple Siri**
 - Apple announces **Siri**, ushering in the age of the voice-enabled digital assistant.
- 2012: **Google Assistant**
- 2013: **Microsoft Cortana**
- 2014: **Amazon Alexa**
- 2016: **Google Home**
- 2017: **Samsung Bixby** etc.

Applications Voice Assistant



Benefits

Having Voice assistants at home can be a great help for:

- **Persons with disabilities.**
- **Entertainment.**
- **Controlling other devices.**

And for businesses as well, Voice assistants can be a great help to:

- **Reduce handling time.**
- **Lower the cost.**
- **Give more convenience to the customer.**
- **Provide faster, tailored and more precise resolution.**

Pitfalls

Though Voice Assistants make our lives easier, it also has a few downsides:

- **Comprehension difficulties**
- **Conversational skills**
- **Ethical and privacy concerns**
- **Access to personal data**
- **Identity theft**

Future of Voice Assistant

- More natural and smooth conversation.
- Enhanced AI and general capability.
- Better Decision Making.
- Consumers shifting to voice search and buying.
- Personalized customer and brand experience.
- Proper voice assistant legislation.

Conclusion

- Despite the existing concerns about perfection or safety, Voice Assistants are becoming increasingly popular.
- They still have a long way to go, but they seem to be a major convenience in our rapid world.
- With the kind of benefits voice assistance offers, most medium to enterprise-scale businesses rely on voice for improved customer service.
- **Voice is here to stay**, and will be the biggest attraction of our day-to-day lives as well as businesses.

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Thank You