



Conversational AI & Natural Language Processing in Healthcare

HSE Conference, December 2023

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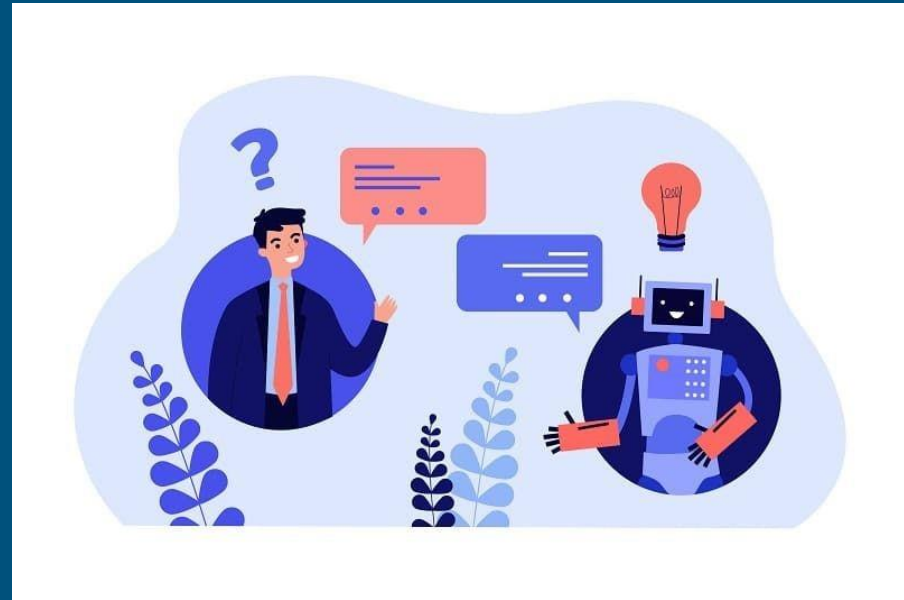


Introduction

- Introducing Conversational AI & NLP
- Applications
- Benefits
- Challenges
- Consent, Privacy and Compliance
- Further Applications

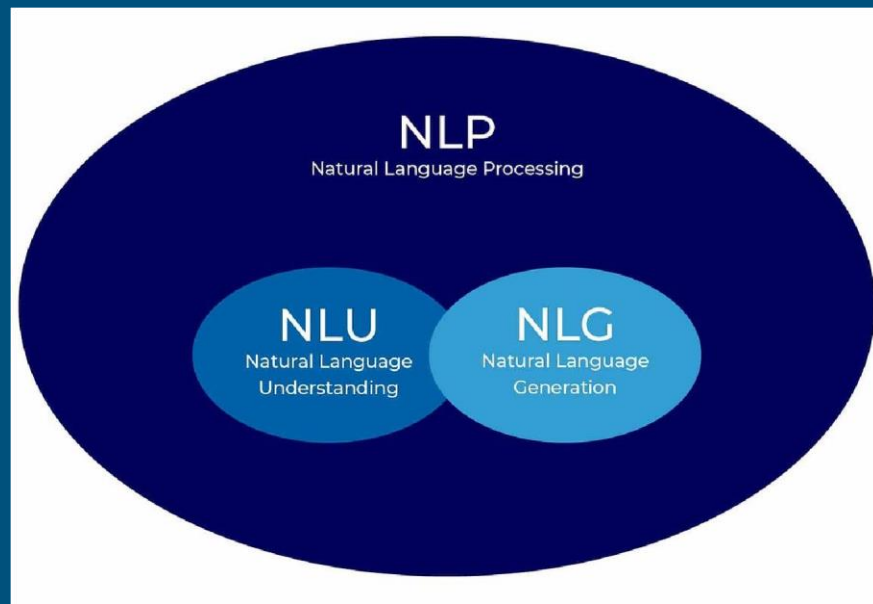
Conversational AI

- **Conversational Artificial Intelligence (AI) is the technology that enables machines to understand and naturally respond to human language.**
- It allows for natural language interactions between users and machines, such as through voice commands or chatbots.
- Conversational AI also can mimic human-like conversations and understand the context of the conversation. This allows for more natural and engaging interactions between users and machines.

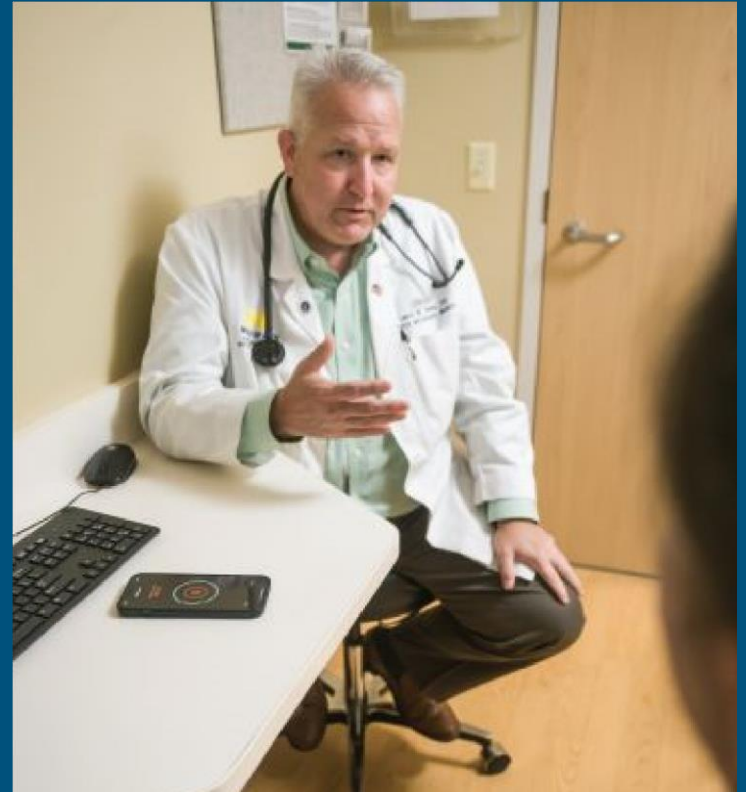


What is NLP?

- **Natural Language Processing (NLP)** is the ability of a computer program to comprehend human speech in written or spoken form.
- **Natural Language Understanding (NLU)** enables a machine to interpret human language. NLU seeks to understand the meaning behind human input, as well as the intent behind it.
- **Natural Language Generation (NLG)** allows machines to write text in natural language.



Applications



- Real-time transcription of doctor-patient interactions
- Voice-enabled EHR (Electronic Health Record) updates
- AI in transcribing medical lectures and seminars
- Enhancing accessibility for disabled patients
- Voice transcription in clinical trials and research
- Efficient documentation in emergency care
- AI-driven dictation tools for healthcare professionals

Benefits for front line staff

The key benefit for front line clinical staff is a reduction in the amount of time writing up reports, resulting in more patient facing time.

Several recent studies have been published from suppliers showing the benefits of using NLP in primary care, eg:

- 7 minutes saved per patient visit, reducing documentation time by 50% *[Nuance DAX]*
- 5 additional appointments added per clinic day *[Nuance DAX]*
- 70% reduction in feelings of burnout and fatigue *[Nuance DAX]*
- 76% reduction in that time spent after clinic hours *[Epic Ambient Listening]*

Benefits for population health

The key benefit for population health is that AI driven NLP can be used to parse digitally scanned written health records, and extract key findings and trends that were previously hidden.

- Huge volumes of unstructured patient data is inputted into electronic health records on a daily basis by the healthcare industry, but it's hard for a computer to help physicians aggregate that critical data.
- Using advanced medical algorithms and machine learning in healthcare, NLP technology has the potential to harness relevant insights and concepts from clinical notes that was previously considered by the healthcare industry as buried in text data form

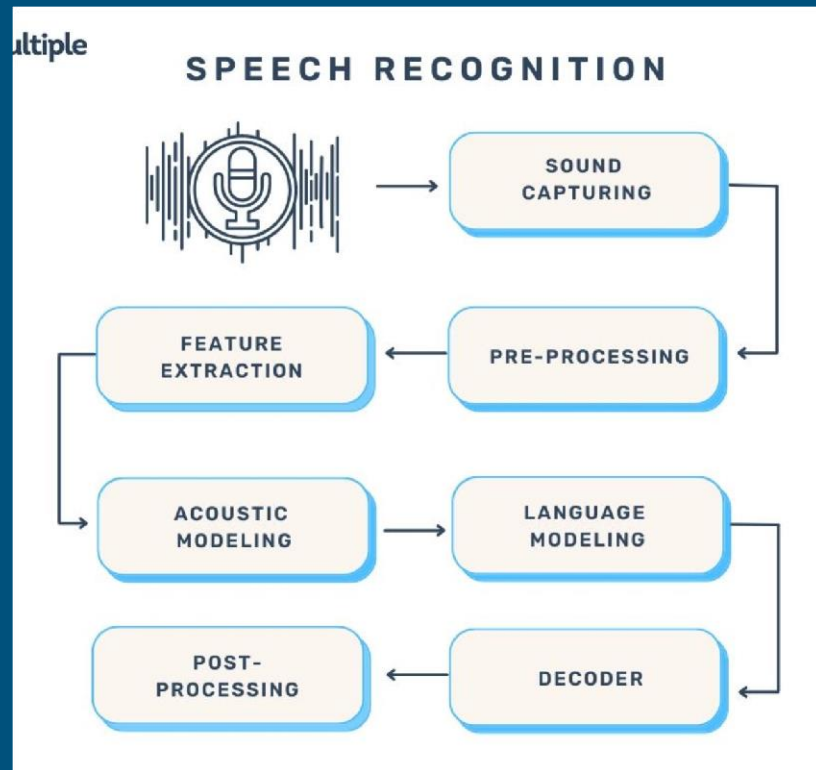
Challenges

- Ensuring data consistency and quality

- Privacy concerns in data handling
- Handling diverse data formats
- Dealing with ambiguous medical terminology
- Integrating data from various sources
- Overcoming language and dialect barriers

Challenges: Voice Capture

- Background noise can impact accuracy
- For best results a headset with microphone is recommended
- In private rooms, a smartphone microphone may be sufficient



- Always test the system before going live in the environment in which it will be used.

Challenges: Accents and dialects

Accents and dialects differ in pronunciation, vocabulary, and grammar, making it difficult for speech recognition applications to recognize speech accurately.

Solution:

To overcome pronunciation variations, it is essential to expand the training data to include samples from speakers with diverse accents. This approach helps the system recognize and understand a broader range of speech patterns.

Addressing these challenges is crucial to enhancing speech recognition applications' accuracy. If the clinician has to correct too many errors, the productivity gain will be eliminated.

Consent, Privacy and Compliance

- Patient consent for using Conversational AI systems
- Ethical considerations in AI healthcare applications
- Secure data sharing between healthcare providers
- Regular audits and compliance checks



- Ensuring GDPR compliance

Challenges: Data privacy and security

Speech recognition systems involve processing and storing sensitive and personal information, such as financial information. An unauthorized party could use the captured information, leading to privacy breaches.

Solution:

You should sensitive and personal audio information transmitted between the user's device and the speech recognition software is fully encrypted end to end. Most modern systems use cloud based technology and it's imperative to understand how it's compliant with health data privacy rules and regulations.

Note: Even if personally identifiable information (PII) is not captured, any voice recordings should be treated as PII.

Challenges: Compliance

GDPR applies to any company holding or processing personal data in the EU. GDPR compliance will require:

- The availability of pseudonymization, so that personal information and data are stored separately
- The use of encryption at record-level, with each user's data secured via a unique key
- A legally-valid audit trail, so that you can track and prove all actions taken
- User consent management, tracking each user's consent to process their data

Further Applications

Once a reliable and performant NLP system is in place and trusted for in-patient communications, other use cases will emerge:

- Telemedicine / Out patient care
- AI-Driven Personal Health Assistants
- Multilingual Conversational AI
- Voice interfaced Hospital Administration

Future of Telemedicine with AI and NLP

- AI can help enhance remote patient data collection and care
- NLP can enrich patient-provider communication
- Capture of voice biometrics and sentiment analysis

- AI-driven health monitoring wearables
- Predictive analytics for remote patient monitoring based on population and personal data metrics

AI-Driven Personal Health Assistants



- Virtual health assistants for daily health monitoring
- Customized diet and exercise plans using AI
- AI in mental health support and counseling

- Personalized medication reminders and tracking
- Enhancing patient education and awareness
- AI in chronic disease management
- Use NLP for responsive and interactive health advice

Multilingual Conversational AI

- Voice-activated systems for patient care
- AI in managing hospital workflows through voice
- Enhancing patient comfort with voice interfaces
- Voice-driven medical record management
- Personalized patient interaction through NLP
- Less staff on screens, and more time with patients

Questions?

Thank You

