

CSSE 315 – Natural Language Processing
Rose-Hulman Institute of Technology

Quiz 04 Solutions

Name (Print): _____ Date: _____

1. The speech chain is a conceptual model describing the process of speech communication. Which of the following sequences best represents the traditional speech chain
 - (a) **Thought** → **Muscle movements (articulation)** → **Airwave (sound signal)** → **Auditory perception**
 - (b) Auditory perception → Airwave (sound signal) → Muscle movements (articulation) → Thought
 - (c) Airwave (sound signal) → Thought → Auditory perception → Muscle movements (articulation)
 - (d) Muscle movements (articulation) → Thought → Airwave (sound signal) → Auditory perception
2. In a spectrogram of a speech signal, what does the **y-axis** typically represent?
 - (a) Time
 - (b) Amplitude
 - (c) **Frequency**
 - (d) Phase
3. The International Phonetic Alphabet (IPA) is used to:
 - a) Represent the orthography of a language
 - b) **Represent the sounds of spoken language**
 - c) Transcribe written text into audio
 - d) Analyze the syntax of sentences
4. Which of the following is a major challenge in ASR?
 - a) **Variations in accents and speaking styles**
 - b) The limited vocabulary of spoken language
 - c) The availability of large training datasets
 - d) The transcribing tools
5. Language models in ASR use probabilities to predict word sequences.
 - a) **True**
 - b) False

6. Provide an example of a linguistic challenge and an example of machine learning challenge when dealing with speech.
Any challenges listed in <https://obscurivn.github.io/mynewbook/recognizer.html>
- 1.
 - 2.
7. Which of the following properties of sound waves were specifically mentioned in the provided material? (Select all that apply.)
- a) **Superposition**
 - a) Diffraction
 - a) **Reflection**
 - a) **Interference**
8. In the context of a sound signal, **amplitude** primarily indicates:
- (a) The pitch of the sound
 - (b) **The loudness or intensity of the sound**
 - (c) The duration of the sound
 - (d) The timbre of the sound
9. In the context of speech signals, **frequency** refers to:
- (a) **The number of sound wave cycles per second**
 - (b) The variation in amplitude over time
 - (c) The duration of a spoken utterance
 - (d) The rate of information transmission
10. Given the IPA transcription /kæt/, which English word does it represent?
- (a) Cot
 - (b) **Cat**
 - (c) Cut
 - (d) Cart
11. Given the IPA transcription /spit/, which English word does it represent? Note - there was a printing glitch with IPA - so this question accepts both Spit and Speech
- (a) Peach
 - (b) Spit
 - (c) Speech
 - (d) Screech
12. When analyzing the waveform and spectrogram of a speech signal, which of the following best describes the typical energy patterns for vowels versus plosive consonants such as [p]?

- (a) Vowels exhibit an irregular energy pattern, whereas consonants like [p] show a sustained and regular energy pattern
 - (b) **Vowels exhibit a regular, periodic energy pattern, while consonants like [p] typically show a brief period of low or no energy (silence) followed by a sudden burst of energy.**
 - (c) Both vowels and consonants display a similar regular energy pattern throughout
 - (d) Vowels exhibit a sudden burst of energy, while consonants like [p] display a consistent energy pattern
13. What are the three main components of the AI agents?
- 1. **Model**
 - 2. **Tools**
 - 3. **Orchestration Layer**
14. Foundational models are capable of accessing the external world information.
- a) True
 - b) **False**
15. Describe one potential application of generative AI agents in a real-world scenario and explain how the agent's functions would be utilized.
- Answer varies. **Any task that would be required to connect externally, like planning, scheduling, searching etc**
16. What does CoT stand for in the context of prompting?
- a) **Chain of Thought**
 - b) Cycle of Transformation
 - c) Context of Training
 - d) Code Optimization Technique
17. Which prompting method encourages the model to explore multiple reasoning paths?
- a) Chain of Thought (CoT)
 - b) **Tree of Thoughts (ToT)**
 - c) ReAct
 - d) Standard Prompting
18. ReAct prompting combines:
- a) **Reasoning and Acting**
 - b) Reading and Acting
 - c) Reasoning and Analysis
 - d) Reading and Analysis