

- 1) Tell a little about yourself including your academic background (e.g., BSc, MSc or PhD program, and which year are you in the program) and your career aspiration.
 - I am pursuing MComp (AI Specialization). It is my last semester (3rd).
 - I am working towards becoming an AI/ML Engineer / Data Scientist / Research Scientist. My interests lie in NLP applications. However, I have tried to explore all domains within AI in my current graduate program to gain maximum exposure, e.g., RL, robotics, Big data systems, etc.
- 2) Why are you taking this class and what do you hope to learn from this class?
 - I have a keen interest in NLP applications. However, most of my projects are related to text. I wish to understand the intricacies of speech synthesis more deeply so that I can explore its use cases.
- 3) Between speech and music, which topic are you more excited about? Why?
 - In some ways, I'm interested in both. Understanding speech is crucial to power most of current industry applications such as chat assistants, real-time transcriptions for different accents, understand speech tones, etc.
 - However, I'm curious to understand how we can quantify musical patterns (key features of different genres, or generating music based on a prompt).
- 4) Do you have any initial idea what kind of project you would like to work on? If yes, describe it in a sentence or short paragraph.
 - Not right now, but I will get an idea as the course progresses.
- 5) How much do you know about digital signal processing (e.g., filters, DFT, feature extraction)?
 - I faintly remember studying it in my 2nd year undergraduate course. Unfortunately, I do not recall most of the concepts now since it has been a while since I last used them (~5 years). I will need some self-revision.
 - Rating: (2/5)
- 6) How much do you know about statistics and probability (e.g., HMM-GMM)?
 - I have a fair working knowledge of them.
 - Rating: (4/5)
- 7) How much do you know about machine learning (e.g., DNN) and toolboxes such as Pytorch?
 - I have a fair working knowledge of them.
 - Rating: (4.5/5)
- 8) Do you have any previous experience with ASR toolboxes such as HTK, Kaldi or Speechbrain?
 - No.

9) Do you have any previous experience with music technology (e.g., production, editing)?

- No.

10) How much do you know about music? Do you sing or play any music instruments? Are you keen to perform in a possible class concert? (This is not at all a requirement for taking this class. This information is only for planning a possible concert this semester)

- I have no professional training, but I sing (was in a band during my undergraduate).
Class concert? Wow, sure!

11) An instrument (e.g., vocal track, piano or violin) can produce sound such as speech or music. Identify your favourite instrument and describe in one paragraph the mechanism how it produces sound.

- My favourite instrument is a Soprano ukulele.
- It has 4 strings - usually made of nylon, 4 pegs to tune the strings to specific frequencies, a finger board to mute/unmute specific strings, marked frets as an indication of the increment of the pitch, a sound hole, and a tail piece. The strings are stretched over the finger board all the way from the pegs to the end of the ukulele (tail piece) in a way such that they are equidistant from each other and not in contact with the finger board. When any one of the strings is plucked by a finger or a pick, it vibrates in a certain frequency. These vibrations travel through the strings all the way to the tailpiece. Since the tailpiece is attached to the hollow end of the ukulele (soundboard), the vibrations transfer through the hollow body (generally filled with air) and get amplified. Finally, the amplified vibrations come out of the sound hole and can be heard as a single note. Multiple strings plucked in succession on different frequencies will produce varied sound waves which is eventually called as music.

12) Discrete Fourier Transform (DFT) is the most important idea CS4347 required from the prerequisite course CS2108. Explain in a sentence or short paragraph your understanding or insight on the essential idea behind DFT coefficients.

- A sound signal can be represented as a sum of sinusoidal waves having different frequencies by applying DFT to it. For a signal of length N , DFT calculates N coefficients that represent how prominent each frequency is in the signal. Higher coefficient magnitude means that the corresponding frequency component in the signal is strong. Moreover, the coefficients are generally complex numbers that represent the phase and amplitude of the sinusoidal waves at different frequencies. Consequently, the DFT coefficients are powerful in analysing sound waves and manipulate them for further downstream tasks.

13) Do you have any experience in developing an app on smartphone/smartwatch/web before? If yes, please describe your previous experience briefly.

- Not much, mostly backend systems.

14) What languages do you speak? How fluently do you speak them (self-assessment of proficiency, with 1 for the beginners and 5 for native speakers)?

- Hindi – 5
- English – 4

15) Please indicate your favourite topics in terms of speech/music analysis and synthesis.

- Speech Recognition
- Studying the rhythm, intonation, and stress patterns in speech to understand its expressive and emotional aspects.
- Dividing a continuous audio stream into distinct speech segments and identifying speakers in multi-speaker scenarios.
- Music Genre Classification
- Music Emotion Recognition
- Identifying sections like verses, choruses, and bridges in music to understand its overall structure.
- Separating different instruments or vocals from a mixed audio recording.
- Music Synthesis: Creating music using computational methods, including algorithmic composition, generative adversarial networks (GANs), and neural networks.
- Personalized music recommendations: Suggesting new music to users based on their listening history and preferences.

Please save your file with the same file name but adding your name and matriculation number at the end and upload your initial survey to Canvas by 8 pm, 17 Aug 2023. This is an important exercise which is counted towards your participation effort (5 Marks). By doing so, you will help shape the course structure in the current semester and future.