Examination problems

Submit until 2022/1/10

Note that: Please finish the report individually, any copy action will be punished for both copying and copied sides. Please use your words but no copy-past; The length of the answer for each question is limited between half page and one page.

1. （13pts）In speech perception, speech signal is decomposed into a number of frequency bands. Please explain the deference between human perception（the auditory models） and Fourier transformation.
2. （13pts）Please explain the relation of the linear spectral frequency (LSF) and the linear predictive coding (LPC).
3. （13pts）The LPCNet uses the traditional algorithm of LPC to increase the calculation effectiveness. Do you have any idea to combine other traditional algorithms into the neural network?
4. （13pts）Please describe the relationship between GMM-HMM and DNN-HMM based speech recognition systems. How to calculate P(X|W) by DNN?
5. （13pts）Please summarize the advantages and disadvantages of DNN-HMM and end-to-end ASR system, and explain the main solutions to address these disadvantages of end-to-end ASR system.
6. （13pts）Please explain the main problems and solutions of traditional signal processing based and deep learning based single channel speech enhancement approaches.
7. （13pts）What is the difference between generative embedding with DNN i-vector and deep speaker embeddings? How to extract X-vector embeddings?
8. （13pts）Read one or more the latest papers about a certain cutting-edge research topic related to acoustic processing; summarize and report the key challenges, novelty and contribution of the referred paper; give your own comments on the referred paper, not limited to its limitations, potential developments, future extensions, etc.