EE6427 Video Signal Processing

CA1 Home Assignment

Instructions:

1. Submit only **a single softcopy pdf file** through NTULearn EE6427 course site under the Assignment tab by **6 Oct 2025**.
2. Name your submitted file as **Surname_GivenName_MetriculationNo.pdf** (e.g., Tan_Yiming_G1234567A.pdf). Note: Capitalize first letter of Surname & Given Name, do not use spacing to replace underscore (_).
3. Write your full name (as in the student card) and matriculation no. clearly on the first page of the submitted assignment.
4. **Late submission or non-compliance of the instructions above may be penalized. Please submit only a single softcopy pdf file. If you submit multiple files, only the main pdf file will be marked.**

1. Two-dimensional Discrete Cosine Transform (2-D DCT) is a transform commonly used in image compression. An image block **A** is given by:

$$\mathbf{A} = \begin{bmatrix} 10 & 10 & 0 & 0 \\ 10 & 10 & 0 & 0 \\ 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 \end{bmatrix}$$

   (a) Compute **manually** the 2-D DCT of **A** using the matrix multiplication method.
   (b) State **an advantage** of using 2-D DCT over 2-D Discrete Fourier Transform (2-D DFT) in transform-based image compression.

2. Controllable video generation is an emerging topic in generative AI. In this homework, you will conduct research and prepare a short write-up on the topic. You may choose a suitable control / guide for video generation (e.g. text-guided video generation, pose-guided video generation, etc.).

   Please use the following format in your write-up. It consists of 2 parts:
   - **Part 1**: State and explain clearly **in less than 100 words** the objective and motivation of your chosen control / guided method for video generation. (e.g., text-guided video generation, or pose-guided video generation, etc.)
   - **Part 2**: Draw an infographic / figure **with size less than three-quarters of an A4 page** that explains one or a combination of the following:
     - Applications for the chosen video generation approach.
     - Methodology of the chosen video generation approach.
     - Impacts / trends / challenges of the video generation approach.

   Other requirements:
   1. Part 1 and 2 above should be **within a single A4 page**.
   2. Include a caption for your infographic / figure.
   3. Include references at the end of the infographic / figure. References are not counted towards the page limit.
   4. Do not plagiarize or use generative AI to generate the infographic / figure.
   5. Conduct research and brainstorming to prepare the infographic / figure.