CS7.404. Digital Image Processing
Monsoon-2022
Assignment-3
Posted on: 24/09/2022
Due on: 14/10/2022, 23:59 Hrs IST

- All your code should be in the `src` directory and images in `imgs` directory.
- Do not use any external library other than **`numpy`** for implementing any of the tasks. You can however use external libraries for I/O operations and plotting. If you are not sure if a library is allowed for a particular task, clarify with your TAs.
- You will be evaluated on correctness and how vectorized your code is - with correctness being the priority.
- Write modular code with relevant docstrings and comments for you to be able to use functions you have implemented in future assignments.
- All theory questions and observations must be written in a markdown cell of your jupyter notebook.
- All academic integrity policies apply. Check the course web page for more clarity.
- Start the assignment early, push your code regularly and enjoy learning!

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1 Ambitious Jo

Seeing your expertise in Image Processing (from the last assignment), Sabre's CEO, Jo Bennett has now decided to add more software features to their scanners. After thorough market analysis they have decided that they want to sell an automatic correction system for OMR sheets - since she knew that such a system, if robust enough, will do well in a country like India - a country with majority of the large-scale competitive exams being objective. Develop a system for Sabre that will achieve this goal.

Assume that the questions had only single correct answers. Do the following:

1. Generate the answer key for the 45 questions given using `answerKey.png`
2. Compute the score of the student - whose answer sheet is `sampleStudentOMRSheet.png`. The exam had the following marking scheme:
   (a) +4 if the answer is correct.
   (b) -1 if the attempted answer is wrong.
   (c) 0 if a question un-attempted.

3. **(Bonus)** Modify the functions you have just written to output the roll number of the student.

Advice: Write modular code - you may have to build on this solution in the next/same assignment - which can be auto-graded. (If it is indeed auto-graded we will release the format details later). **Also, this question can involve a fair amount of experimentation - so start early**.

Expectations: We expect you to implement morphological operations for this question.