SGN-12007 Introduction to Image and Video Processing
Project work

To complete the project work, you need to fulfil the following requirements:

1. Select one of the projects below
2. Implement Matlab code (it should be commented well enough to follow) to solve the task
3. Write a report as instructed below
4. Collect your report, your code and your input/intermediate/final images/videos to a single zip file named as student-name.zip. Name your images/videos clearly to specify original and processed images. Use your images/videos also in your report as needed, but submit them separately nevertheless.
5. Submit your zip file via **Moodle by 22nd of December, 4PM (hard deadline)**

   If your data is bigger than 50MB (maximum submission size in Moodle), you can use OneDrive/Dropbox and provide links to your images/videos in the report.

   Any questions related to the project work can be discussed during the lecture on Nov 27th 2017. Later you can send your questions to jenni.raitoharju@tut.fi.

How to Report?
For each project, you need to decide a strategy and apply several processing steps to the input in order to produce the desired output. The report should describe the goal, the methods (strategy), the reasoning behind, the findings and the metrics used to measure performance. The report must use the IEEE template for conference paper in this link below:

https://www.ieee.org/conferences_events/conferences/publishing/templates.html

A sample report is provided in this link below:
https://web.stanford.edu/class/ee368/Project_Autumn_1617/Reports/report_zhang_s.pdf

Grading:
You get 1 point when the minimum requirements are fulfilled. This includes application of some basic image/video processing techniques with description/analysis of the results, report, code, input and output images/videos. You get one more point if you do the following:

- Apply sequential processing (series of processing steps) of images/videos in a well justified manner
- Well-documented Matlab code (we can follow what you have done), well-written report (reasoning behind the selection of the specific methods and proper conclusions).

Project 1: Art enhancement/restoration
Art should be studied and admired in the form the artist has made it. However, many of us may have the urge to modify the art to please us more, or the original art has suffered some accidents which have led to a degradation of its visual appearance. Though we recommend that you do not alter any artist's work, for the sake of this course project, we will indulge ourselves in selecting 10 different art images from the Web Gallery of Art (https://www.wga.hu/index1.html) and devise a strategy to enhance and or restore (in grey and or color) the selected art. For each selected image (you are free to select any images to fulfil your needs), explain the reason why it was selected, what is your goal, what is your processing strategy and why, produce the output image(s) (can be more than one output) and measure your performance. No artificial noise or blurring should be introduced by you in any of the images (otherwise the task would be trivial).

Project 2: Old Movies restoration and pseudocoloring

You know that you should not alter classic movies, right? Yes, but for the sake of this project, we will indulge ourselves into modifying old movies in ways to bring them to the current century. First old movies may suffer from many artefacts, including blurring, noise, scratches, and illumination (among other issues). In addition, early old movies are in black and white! In this project, you will select a 10-min (or longer) section of an old movie from Black White Movies (http://www.bnwmovies.com/the-stranger.html) and do the following. Tell us why you selected the movie and the particular video clip from the movie (for longer than 10 min movies). What is your goal, what is your processing strategy (methods/algorithms you wish to apply and in which order) and why, show us your output video and assess the performance of the methods used.

Project 3: Anomaly detection in medical images

Image processing offers important tools for doctors and specialists to assist them during diagnosis. The subjects are imaged with an appropriate imaging system (e.g. X-ray, PET, CT, Ultra Sound, or even visible spectrum, etc.) and image processing tools are used to help doctors perform diagnosis. In such images, doctors are often looking for anomalies (strange objects or color, irregular shapes or fractions, and so on). Let us refer to these as anomalies. So, image processing tools are used in this case to detect anomalies. In addition, some of the images may require pre- or post-processing in order to detect anomalies if they exist. Select 10 images (two images from each imaging system) from the Open-Access Medical Image Repositories (http://www.aylward.org/notes/open-access-medical-image-repositories) and do the following. Explain what each image represents and how it was obtained. What is your goal, what is your processing strategy (methods/algorithms to apply) and why you select this strategy, show us the results of your analysis and assess your performance.