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ELE 492 Image Processing
MIDTERM EXAM

Assoc. Prof. S. Esen Yüksel **2023**

- **For all the questions, download and use the full-sized original figures from the given links.**
- **This is an exam. Late submissions will not be accepted.**
- **Submit a written report as a .pdf file. Put your Python codes in the Appendix of the report. Do not submit .zip files, and do not submit code files. Submissions without an Appendix will be graded over 50 pts.**
- **All honesty rules apply.**

Q1. Download the full-sized **2.2.07 Oakland** figure from the following link:
https://sipi.usc.edu/database/database.php?volume=aerials&image=19#top

Using the algorithms you learned in class, and also the algorithms you can research; devise a structured way to enhance this image and explain it. Plot the framework of the algorithms (which one comes after the other), and explain why this process has been chosen.

Q.2) The image haze.png has been used in several publications dealing with the problem of removing fog from an image (*dehazing*).

- K. He, J. Sun, X. Tang, « Single image haze removal using dark channel prior », *IEEE Transactions on Pattern Analysis and Machine Intelligence*, 2011.
- D. Berman, T. Treibitz, S. Avidan, « Non-Local Image Dehazing », CVPR 2016.

Using **image transformations** you learned in class as well as other methods you may research, dehaze the following image. **Describe all the methods you implement in detail.**

https://vincmazet.github.io/bip/_static/data/haze.png

Q.3) Devise a way to detect and count the number of pools in the following image.

https://vincmazet.github.io/bip/_static/data/moliets.png

Q.4) Meta AI's "Segment Anything" and Microsoft's "Segment-Everything-Everywhere-All-At-Once" are two significant advancements that have taken place this year. Experiment with their Demo files, run their codes with your own images, and discuss the advantages and limitations of the methods. Additionally, read their papers and try to explain the concepts in your own words.

- Segment Anything:

Demo: https://segment-anything.com/

Code: https://github.com/facebookresearch/segment-anything/blob/main/notebooks/predictor_example.ipynb

- Segment-Everything-Everywhere-All-At-Once

Paper: https://arxiv.org/abs/2304.06718

Demo: https://huggingface.co/spaces/xdecoder/SEEM