MIT CSAIL

6.8300/6.8301 Advances in Computer Vision

Spring 2024

Problem Set 7

Posted: April 18, 2024 **Due:** April 30, 2024

Submission Instructions: 6.8300 and 6.8301 students should complete Problems 1 and 2. You will need to submit two files.
For Problem 1, submit a PDF file under the relevant heading in Gradescope. If you are part of a team, you should write your progress report together and **only one of you** should submit the PDF. In that case, please list your partners' names and MIT Kerberos IDs (if you have one) in the PDF.
For Problem 2, submit both your completed Python notebook (.ipynb) as well as the pdf version of it under the relevant headings in Gradescope. Do not submit anything for Problem 3. The relevant material for these Problems was covered in Lecture 19 and the talk on Stable Diffusion.

Late Submission Policy: You **cannot use grace days** for Problem 1 as we plan to provide feedback on a rolling basis after it is due. If you do submit late, the regular late policy applies: If you submit within 7 days (rounding up) of the original deadline, you will receive partial credit. Such submissions will be penalized by a multiplicative coefficient that linearly decreases from 1 to 0.5. Grace days may be used for Problem 2.

Problem 1 *Project Progress Report* (5 points)

The quality and clarity of your report may allow for better feedback, besides a better grade.

Satisfactory:

Describe your experiment plans and also allocate responsibility between team members.

Recommended:

The progress report can be a draft on the way to the final report, around $1-2$ pages, including a sketch of the abstract, introduction, related work, the proposed method (as rigorous as possible), what you have done so far (including data setup, preprocessing, experiments, and/or results), and your plan for completing the project on time. For teams, clearly identify which students will run which experiments. It should be in CVPR format. The report will be graded for rigor and clarity.

Writing a progress report can provide you with a clearer picture of the state of your project and help you make a realistic plan to complete it. The content of your progress report will

ultimately form a significant part of your project report and thus will save you time at the end of the term. You may get better feedback from a better report.

Problem 2 *Texture Synthesis* (10 points)

In this problem you will implement the Efros and Leung algorithm for texture synthesis [1] discussed in Section 9.3 of Forsyth and Ponce [2]. In addition to reading the textbook, you may also find it helpful to visit Efros' texture synthesis website in which many of the implementation details described below can be found.

Details are provided in the notebook labeled Problem 2.

Problem 3 *Stable Diffusion* (0 points)

If you would like to learn more about diffusion models or use them for your final project, you may be interested in this optional question. Details are provided in the notebook labeled Problem 3. Do not submit this notebook for grading.

References

[1] Alexei A Efros and Thomas K Leung. Texture synthesis by non-parametric sampling. In *ICCV*, 1999.

[2] David A Forsyth and Jean Ponce. *Computer vision: a modern approach*. Pearson,, 2012.