Reproducibility Report for ACM SIGMOD 2022 Paper: "Controlled Intentional Degradation in Analytical Video Systems"

MANOJ MARNENI, University of Utah, USA
PRASHANT PANDEY, University of Utah, USA

The paper presents, Smokescreen, a prototype system for video degradation-accuracy profiling. Smokescreen illustrates the tradeoff between increased analytical accuracy and increased amounts of degradation using a tradeoff curve. In their evaluation, they perform experiments on two video datasets, two detection models and four aggregate query types. The reproducibility fulfills this objective, since it produces results similar to the paper results.

1 INTRODUCTION

The reproduced paper [1] is written by He and Cafarella from University of Michigan and Massachusetts Institute of Technology respectively. The paper develops a new system, Smokescreen, for video degradation-accuracy profiling. The reproducibility effort shows similar results to the ones displayed on the paper.

2 SUBMISSION

The source code, latex code for building the paper and the scripts are available at: https://github.com/wenjiah/video_degradation. The README contains appropriate scripts and instructions to download required data for the experiments, run experiments, and plot results.

The setup requires python 3.7 and the list of dependencies can be found at https://github.com/wenjiah/video_degradation/blob/main/requirements.txt. Furthermore, GPU hardware is required to perform experiments.

3 HARDWARE AND SOFTWARE ENVIRONMENT

We reproduced all the experiments on Kingspeak node in CHPC (https://www.chpc.utah.edu/documentation/guides/gpus-accelerators.php#kgn).

Table 1. Hardware & Software environment

	Paper	Repro Review
CPU	Intel Xeon Gold 6130	Intel E5-2680
GPU	GeForce GTX 1080 Ti	Tesla P100
cores	64	14
GHz	2.1	2.4
RAM	512GB	256GB
Storage	N/A	N/A

4 REPRODUCIBILITY EVALUATION

4.1 Process

The process for reproducibility started by downloading the two video datasets using "wget" command and following the instructions given in the README. Then we performed frame selection using the script "gen_sample_frames.py". The second step involved object detection. For object

detection, MTCNN is used for face, Mask_RCNN is used for car, and YOLOv4 is used for detecting car and person. The above steps are repeated for several resolutions.

4.2 Results

There are seperate scripts to genrate each figure from the paper. We ran individual scripts to generate figures 4–10. In our initial experiments, Figures 4a, 4b, 5, and 6a showed similar results to the ones presented in the paper. However, Figures 6b, 7, 9, and 10 showed a different pattern than the ones in the paper. We reached out to the authors regarding this. The authors were helpful and responded quickly. They pointed that all the figures that showed different results were related to YOLOv4. They pointed out that the analytical error does not change much with the frame resolution in Figure 6b that we produced. They mentioned that this could be because of the YOLOv4 config settings. After changing the configuration settings we were able to produce similar figures as the ones from the paper.

5 SUMMARY

The evaluation of the reproducibility results shows that it produces similar results compared with the paper results.

REFERENCES

[1] Wenjia He and Michael Cafarella. 2023. Controlled Intentional Degradation in Analytical Video Systems. In *Proceedings of the 2023 ACM SIGMOD International Conference on Management of Data*. 1431–1446.