

PA1 Report

Topic : Abnormal detection using VAE

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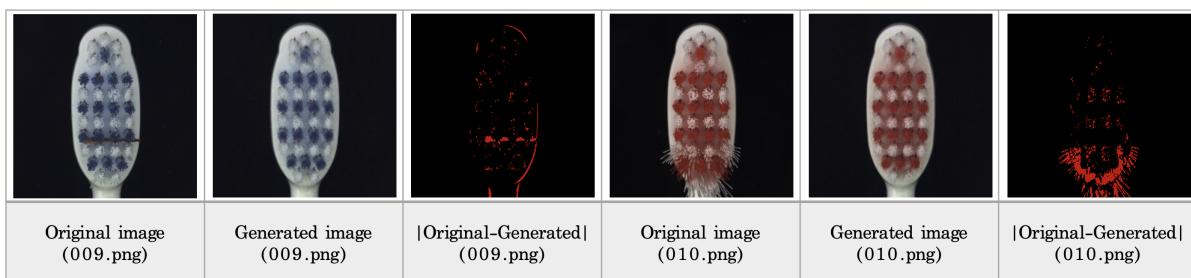
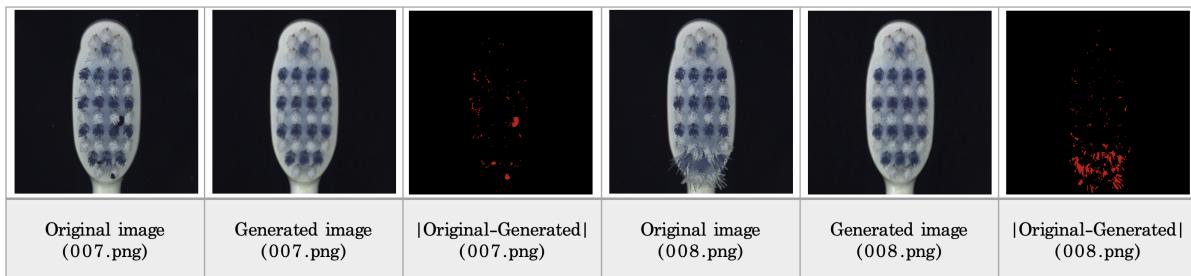
1. Test class

1.1 Attach plots for 001.png through 010.png located in the test folder of the tooth brush object in the report file. [15 points]

Original image (001.png)	Generated image (001.png)	Original-Generated (001.png)	Original image (002.png)	Generated image (002.png)	Original-Generated (002.png)

Original image (003.png)	Generated image (003.png)	Original-Generated (003.png)	Original image (004.png)	Generated image (004.png)	Original-Generated (004.png)

Original image (005.png)	Generated image (005.png)	Original-Generated (005.png)	Original image (006.png)	Generated image (006.png)	Original-Generated (006.png)



1.2 Describe the logic behind how this method is working for the abnormal detection in the report file.[20 points]

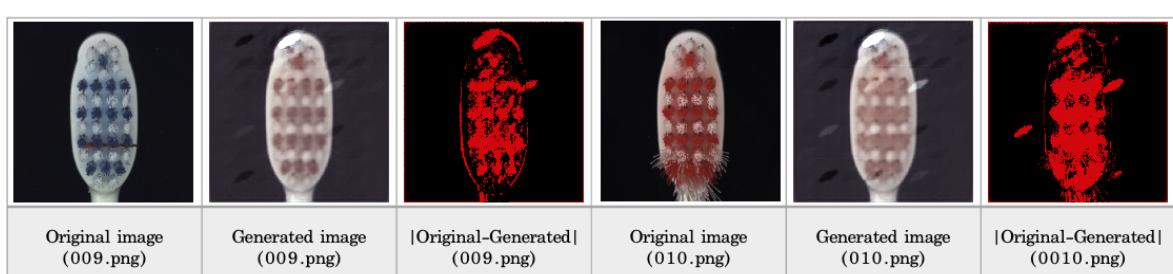
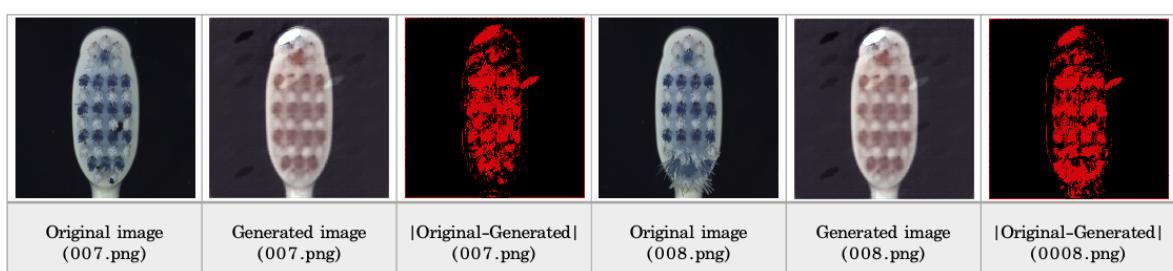
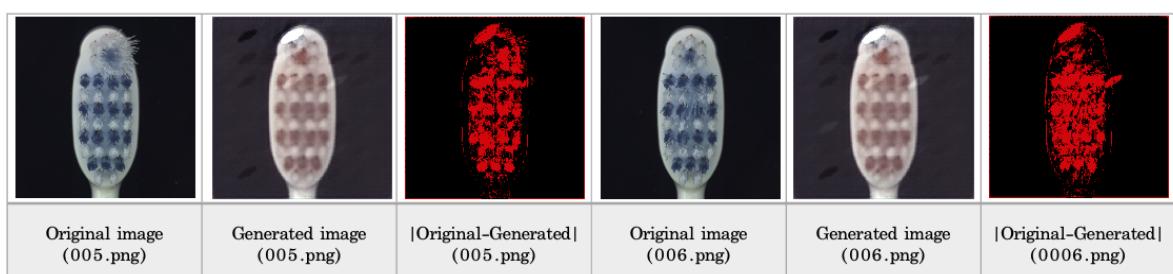
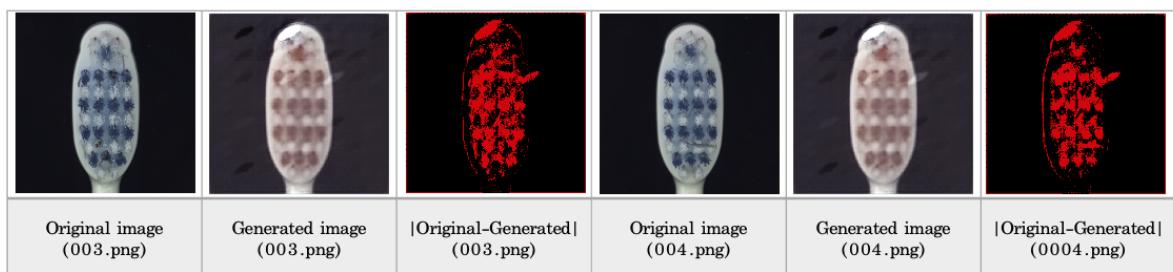
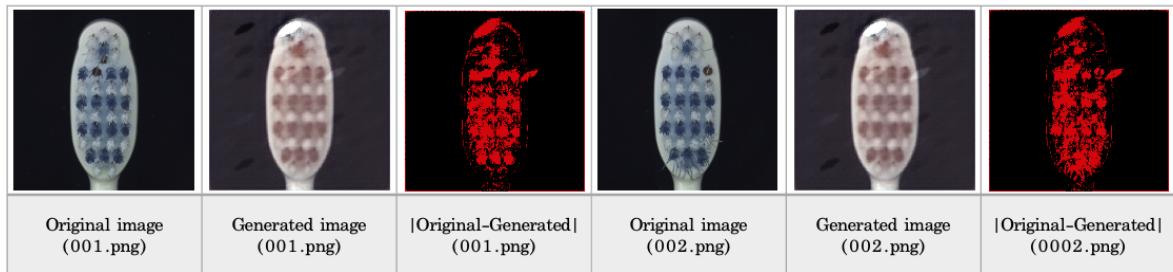
- Our goal is to measure the defective part of the image using the difference from pseudo ground truth.
- Pseudo ground truth learns with a VAE based on large-scale normal data and finally the model has a parameter of the average image.
- Normal images are generated as VAE parameters learned by input of defective images.
This image plays a role in the fake ground truth.
- The defective image is compared to pseudo ground truth, and if the difference in threshold hold is greater than 0.4, it is judged that there is abnormal.

2. Train class

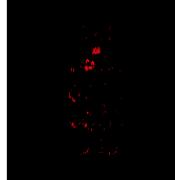
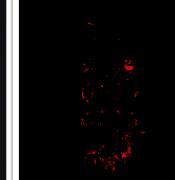
2.1 Attach plots for 001.png through 010.png located in the test folder of the toothbrush object in the report file using weight files obtained at 10 epoch and at 500 epoch, respectively.

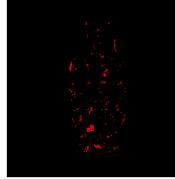
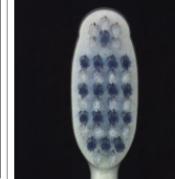
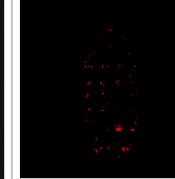
[20 points]

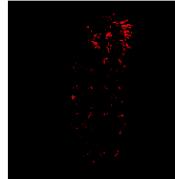
2.1.1 Results of 10 epoch

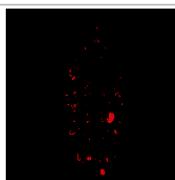
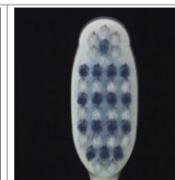


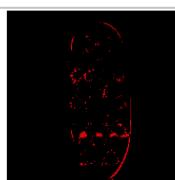
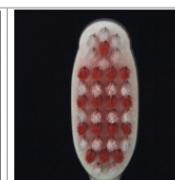
2.1.2 Results of 500 epoch

					
Original image (001.png)	Generated image (001.png)	Original-Generated (001.png)	Original image (002.png)	Generated image (002.png)	Original-Generated (0002.png)

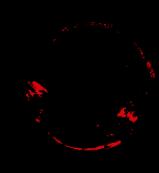
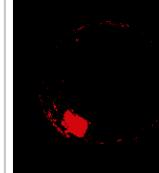
					
Original image (003.png)	Generated image (003.png)	Original-Generated (003.png)	Original image (004.png)	Generated image (004.png)	Original-Generated (0004.png)

					
Original image (005.png)	Generated image (005.png)	Original-Generated (005.png)	Original image (006.png)	Generated image (006.png)	Original-Generated (0006.png)

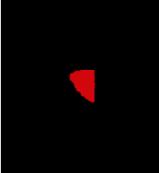
					
Original image (007.png)	Generated image (007.png)	Original-Generated (007.png)	Original image (008.png)	Generated image (008.png)	Original-Generated (0008.png)

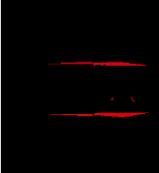
					
Original image (009.png)	Generated image (009.png)	Original-Generated (009.png)	Original image (010.png)	Generated image (010.png)	Original-Generated (0010.png)

2.2 Train the model for 'bottle' and 'capsule' objects. Then, test it for below images and attach the results in the report. [20 points]

					
Original image (bottle/test/ broken large/001.png)	Generated image (bottle/test/ broken large/001.png)	Original-Generated (bottle/test/ broken large/001.png)	Original image (bottle/test/ broken small/004.png)	Generated image (bottle/test/ broken small/004.png)	Original-Generated (bottle/test/ broken small/004.png)

					
Original image (bottle/test/ contamination/007.png)	Generated image (bottle/test/ contamination/007.png)	Original-Generated (bottle/test/ contamination/007.png)	Original image (capsule/test/ crack/001.png)	Generated image (capsule/test/ crack/001.png)	Original-Generated (capsule/test/ crack/001.png)

					
Original image (capsule/test/ crack/010.png)	Generated image (capsule/test/ crack/010.png)	Original-Generated (capsule/test/ crack/010.png)	Original image (capsule/test/ poke/000.png)	Generated image (capsule/test/ poke/000.png)	Original-Generated (capsule/test/ poke/000.png)

		
Original image (capsule/test/ squeeze/000.png)	Generated image (capsule/test/ squeeze/000.png)	Original-Generated (capsule/test/ squeeze/000.png)

2.3 Analyze the effect of the constant for combining the reconstruction loss and KL divergence loss in vae_loss implemented in the Trainer class:

recon_loss + 0.000001 * kl divergence

2.3.1 How the generated images are changed as we increase or decrease it from the initial value '0.000001'? [15 points]

- If it is larger than the initial value, the image will appear close to the average image of the dataset.
- If it becomes smaller than the initial value, the image will show its original appearance(test data).

2.3.2 Please discuss the possible reasons for that. [5 points]

- If the initial value increases, the bias of normal data increases because it is learned mainly by kl-divergence term.
- If the initial value becomes smaller, it is created close to the existing test data because it is learned mainly about reconstruction loss.

Option. How to execute my code?

1. Copy the main.py to google colab(ipynb).
2. Upload datasets in google drive.
3. Upload .pth files in google drive.
4. Upload .py files in google colab environment.
5. Check the folder path, it is conformed by original source code's location!