New Algorithm for Generating Disaster Images

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Previous Work

- Confirmed that traditional Korean houses (Hanok) were not included in the training of existing Text to Image models.
- Used various fine-tuning techniques to train the models on Hanok images.

- Analyzed the number of images used for training and the results by model.
- Investigated the causes and identified what aspects need further research for improved results.

Previous Work

[Summary]

- The goal of this research is to generate disaster images using image generation models.
- Currently, image generation models are composed of large datasets, which makes it challenging to generate terrain images specialized for a specific country.
- To train existing image generation models data they don't know and to assess the results, a dataset with distinctive Korean traditional houses, Hanok, was compiled.
- The results of adding Hanok images to the training using four different fine-tuning techniques were observed and analyzed.
- Ultimately, it was found that using the Dreambooth model yielded the best results in terms of time and performance, although this may vary depending on computer specifications.

[Future Works]

- Exploring editing and synthesis techniques rather than image generation.

- Attempt to construct a disaster image generation algorithm.

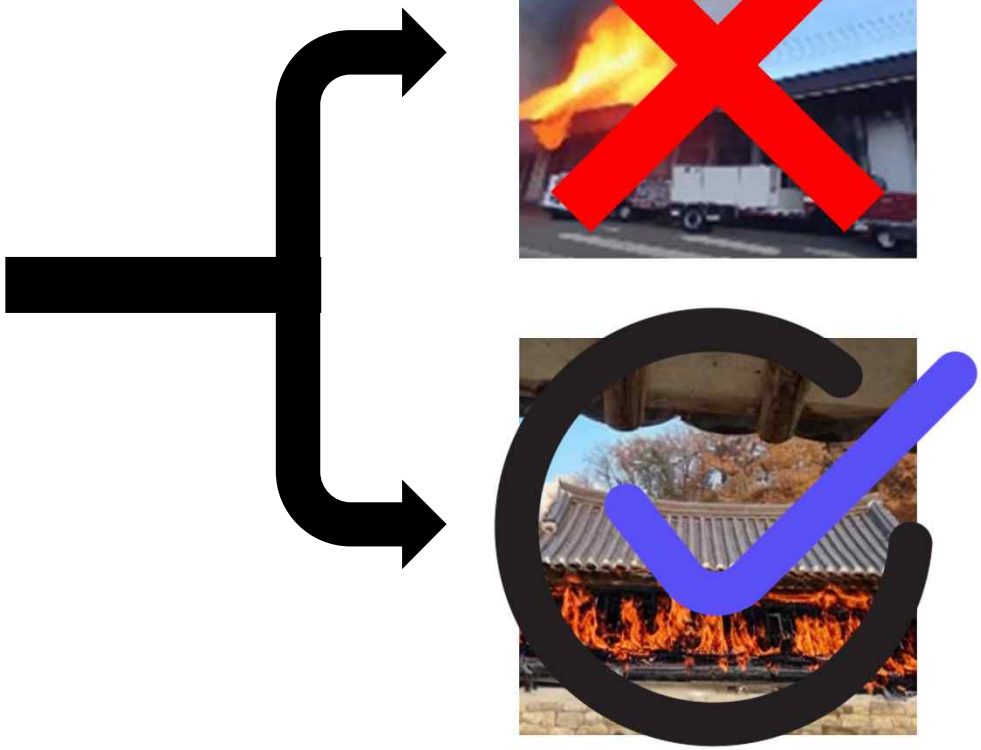
Contents

1 Introduction

Challenges in Creating Comprehensive Disaster Images

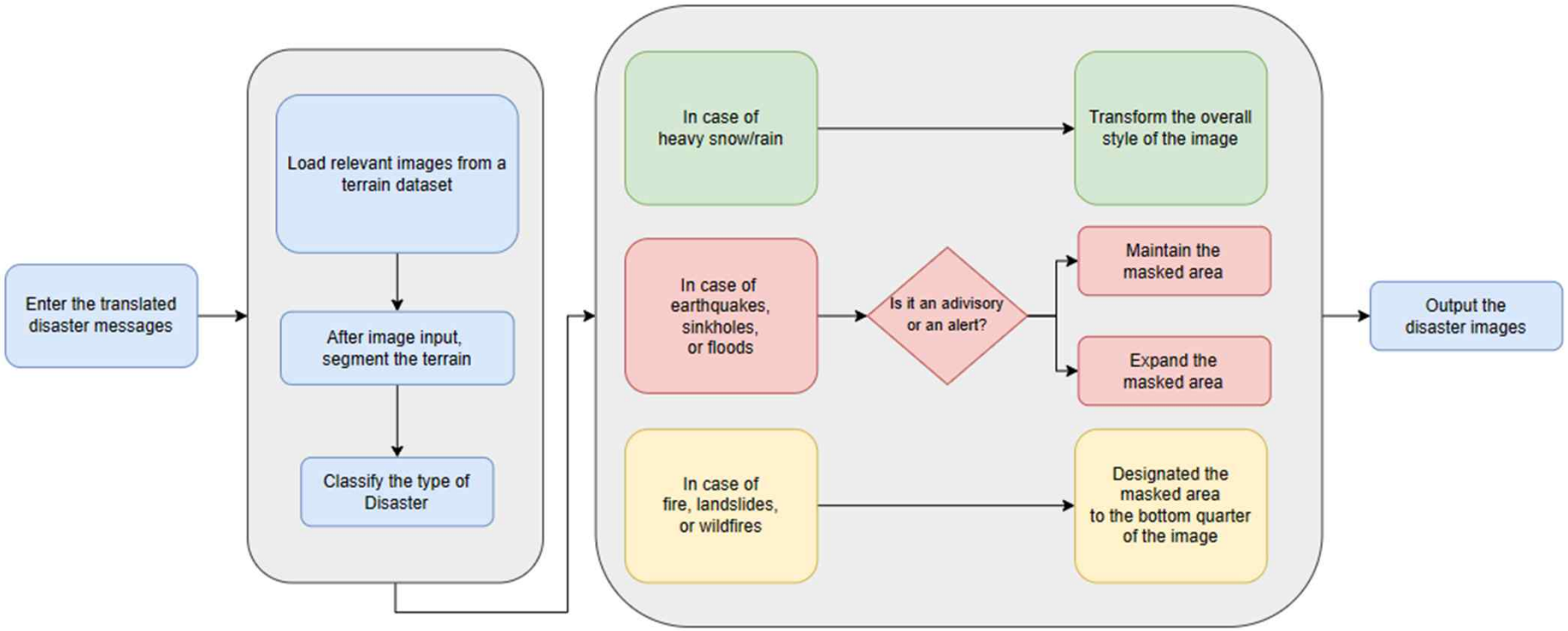
1 Introduction

Challenges in Creating Comprehensive Disaster Images



1 Introduction

New Disaster Image Generation Algorithm



2 Background

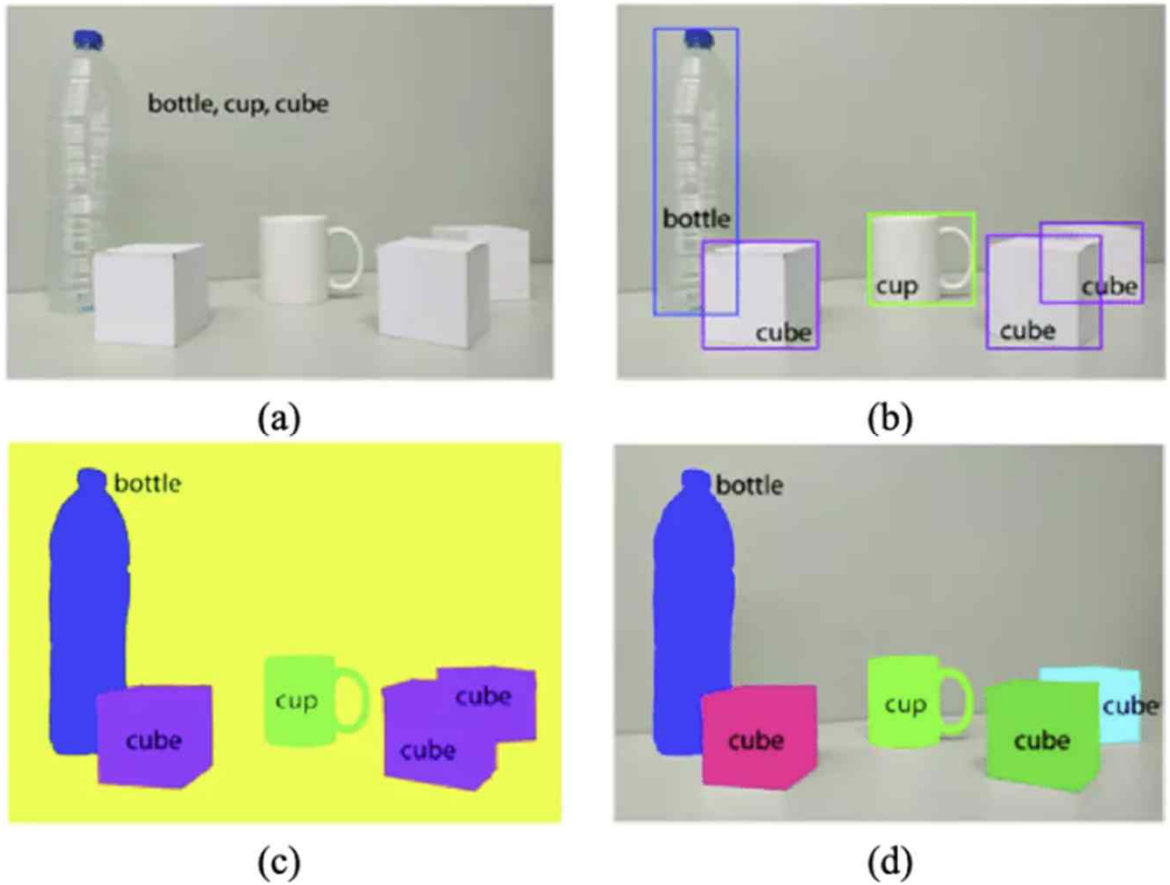
What is Segmentation

(a) Image classification

(b) Object detection

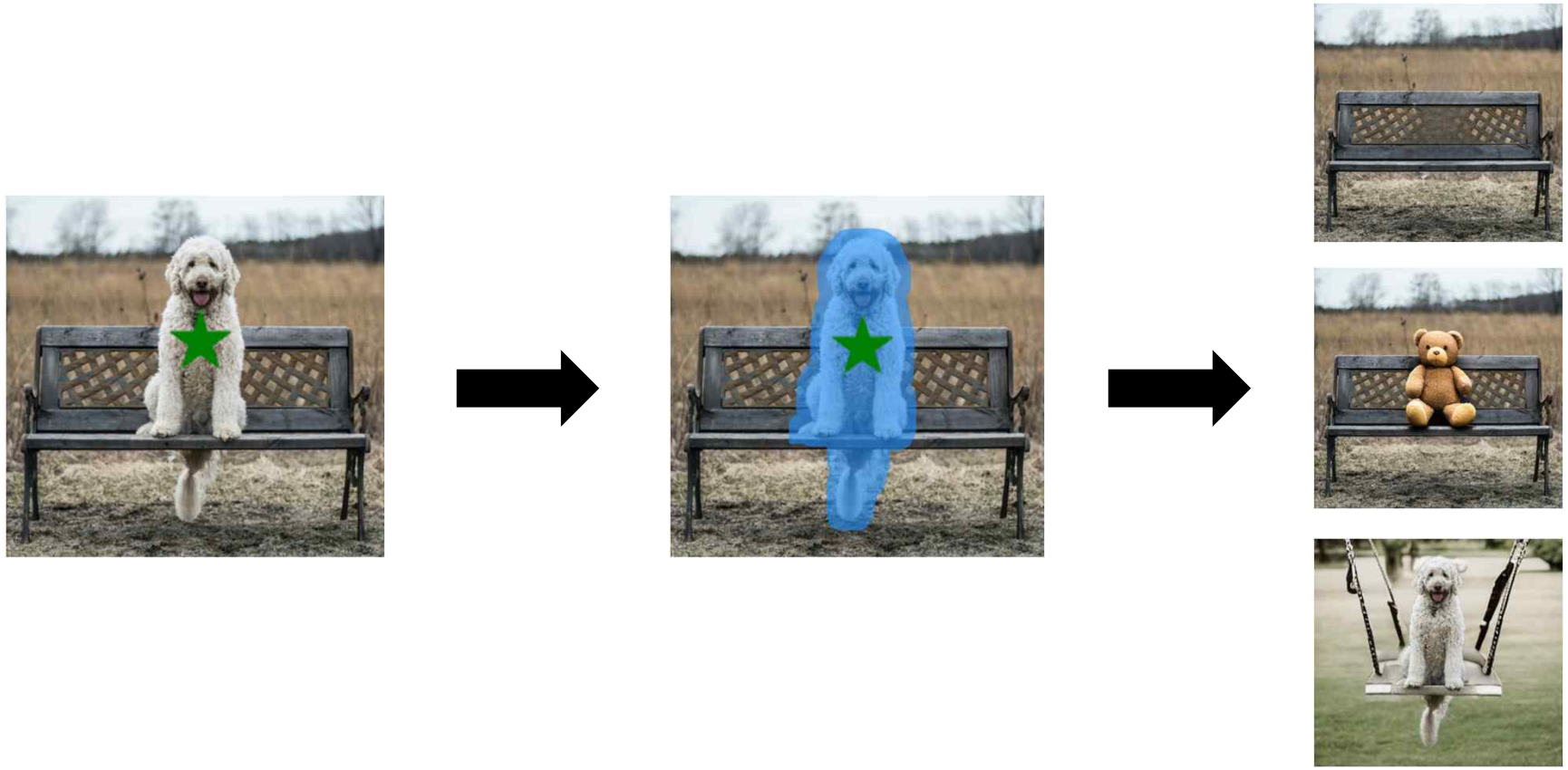
(c) Semantic segmentation

(d) Instance segmentation



2 Background

What is Image Inpainting



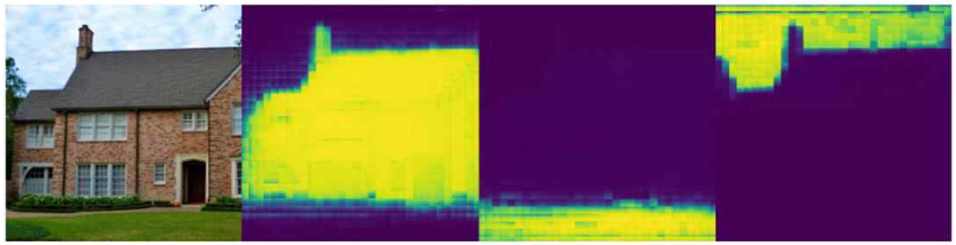
2 Background

How are segmentation and inpainting used?

When creating disaster images using a pre-trained model, a lot of additional research is required.
Therefore, instead of creating disaster images from scratch,
a method of synthesizing disasters onto existing images is proposed,
using image segmentation and inpainting techniques.

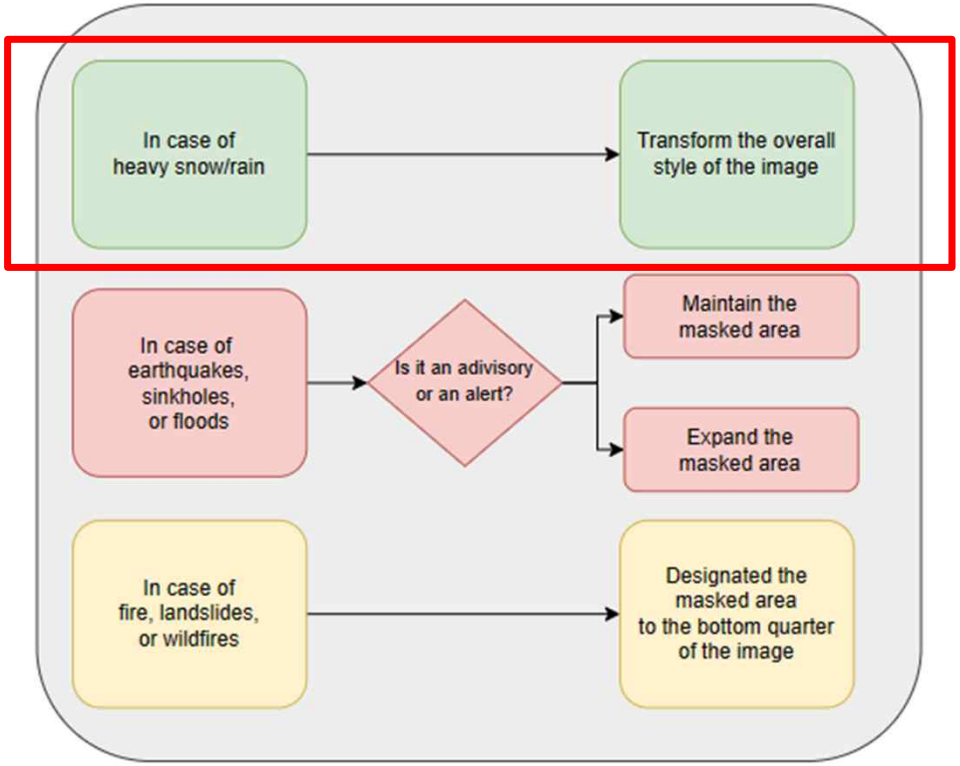
Segmentation: Classifying objects within the image, locating their positions, and assigning individual labels.

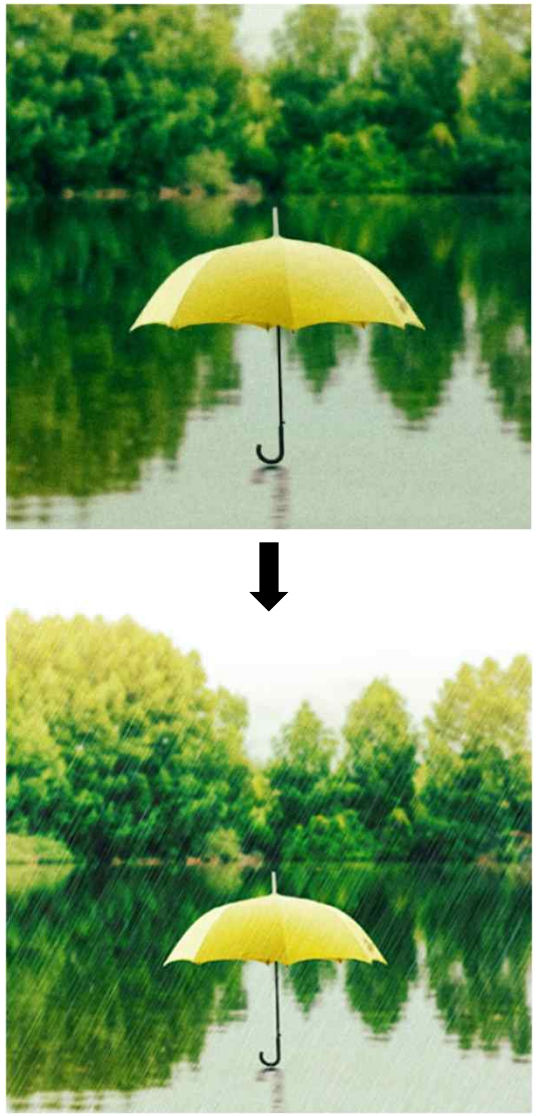
Inpainting: Applying a diffusion process to the image pixels around damaged areas, assigning values to the image pixels, and determining the values differently based on how close they are to the damaged areas.



3 Disaster image generation

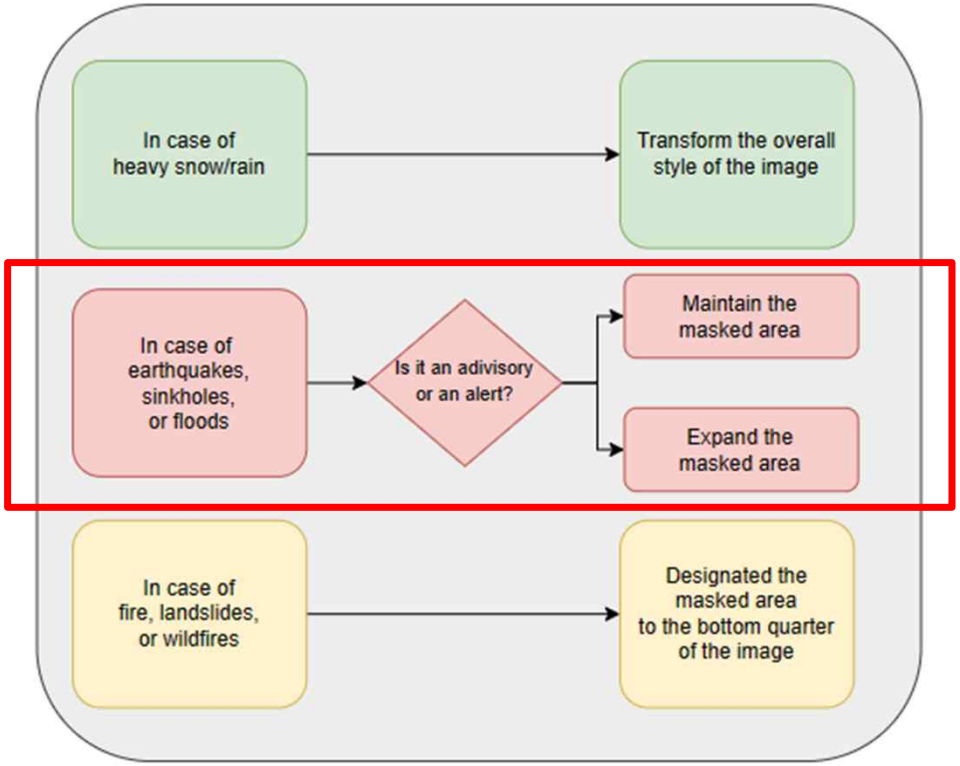
Style transfer - Ongoing

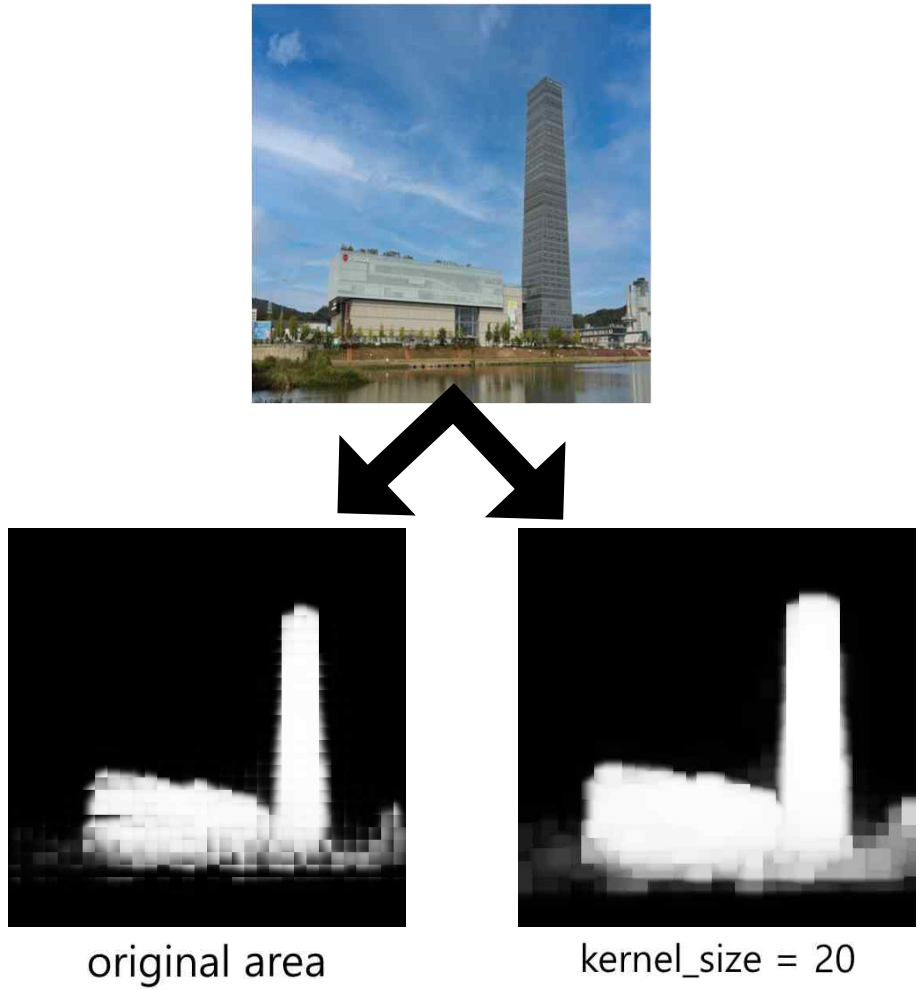




3 Disaster image generation

Expand mask area - finished

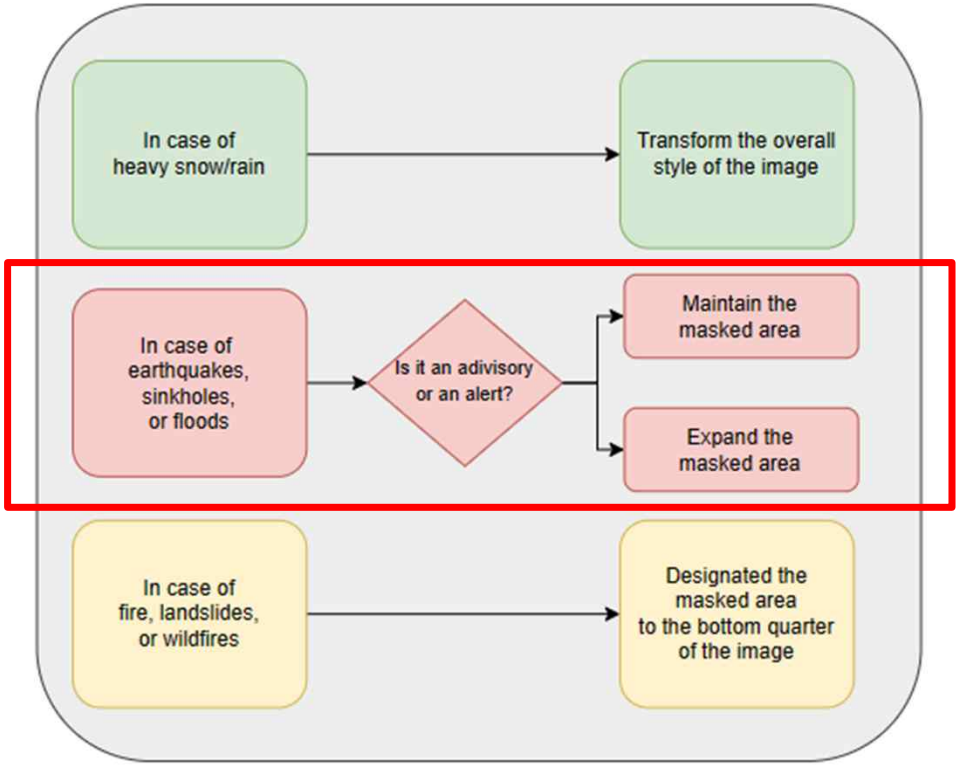


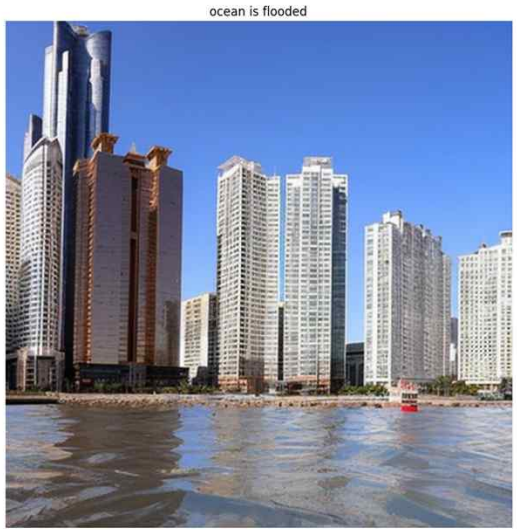


original area kernel_size = 20

3 Disaster image generation

Expand mask area - finished



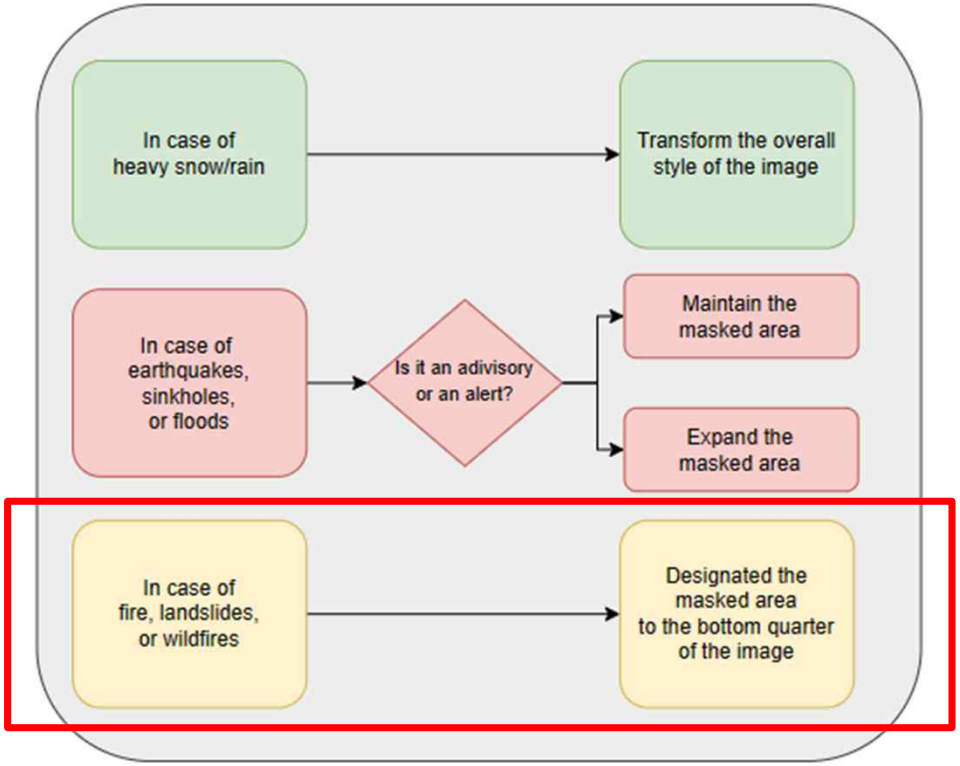


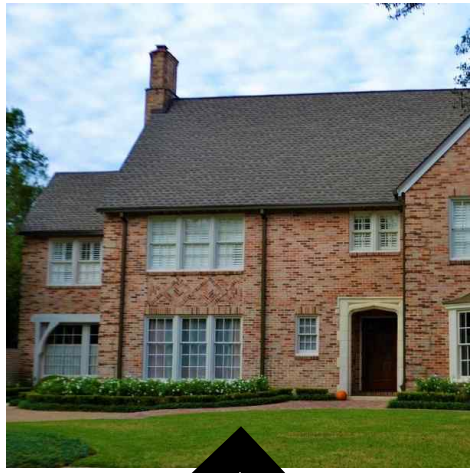
inpainting - original

inpainting – expansion

3 Disaster image generation

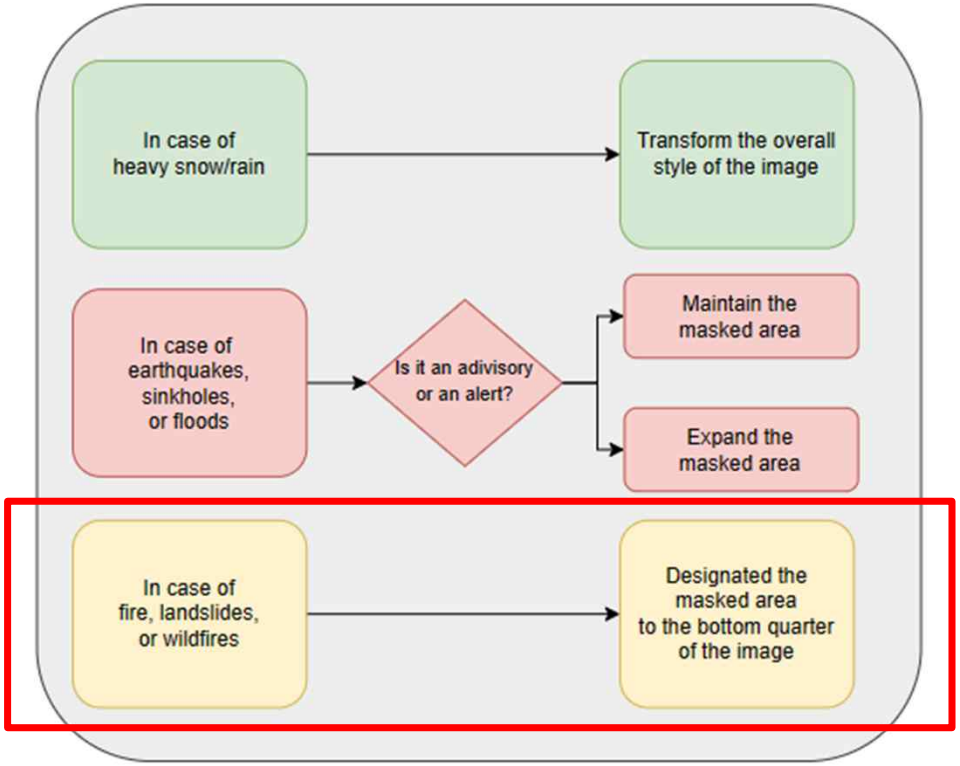
Bottom quarter mask area - Ongoing





3 Disaster image generation

Bottom quarter mask area - Ongoing



4 Conclusion

Summary & Future Works

[Summary]

- Difficulty in creating disaster images in Korea using existing image generation models and fine-tuning
- Attempting to create disaster images through image partial creation (inpainting), instead of full image generation
- For disasters that require whole image area transformation like heavy rain and heavy snow, applying entire image style transformation
- Separating disaster watch and warning for partial disasters like floods, sinkholes, and earthquakes
- For a disaster watch, slightly expanding the existing segment area
- For a disaster warning, further expanding the existing segment area
- For situations like wildfires and landslides, designating the lower 1/4 area of the segment

[Future Works]

- Researching optimal disaster image creation prompts

- Studying the designation of segment areas for each disaster

Thank you

Q&A