Time-varying Weathering in Texture Space

Mid Evaluation

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Given an input image of a weathered texture, our project aims to synthesize a series of textures emulating a weathering and de-weathering processes, yielding a time-varying texture.

OBJECTIVE

Introduction

OBJECTIVE: Given an input image of a weathered texture, our project aims to synthesize a series of textures emulating a weathering and de-weathering processes, yielding a time-varying texture.

This would be done by computing an estimated age map of the texture based on the prevalence of similar patches in the texture. Further, using this age map, an intact texture would be generated to achieve the desired results.

To produce de-weathered textures, the age map has to be manipulated to control an interpolation of the intact texture and the input texture. Weathered textures can be synthesized by extrapolating the differences between the input texture and the intact texture.

An overview of the method involved

PAST   FUTURE

De-Weathered Texture Generation

Age Map Creation

Weathered Texture Generation
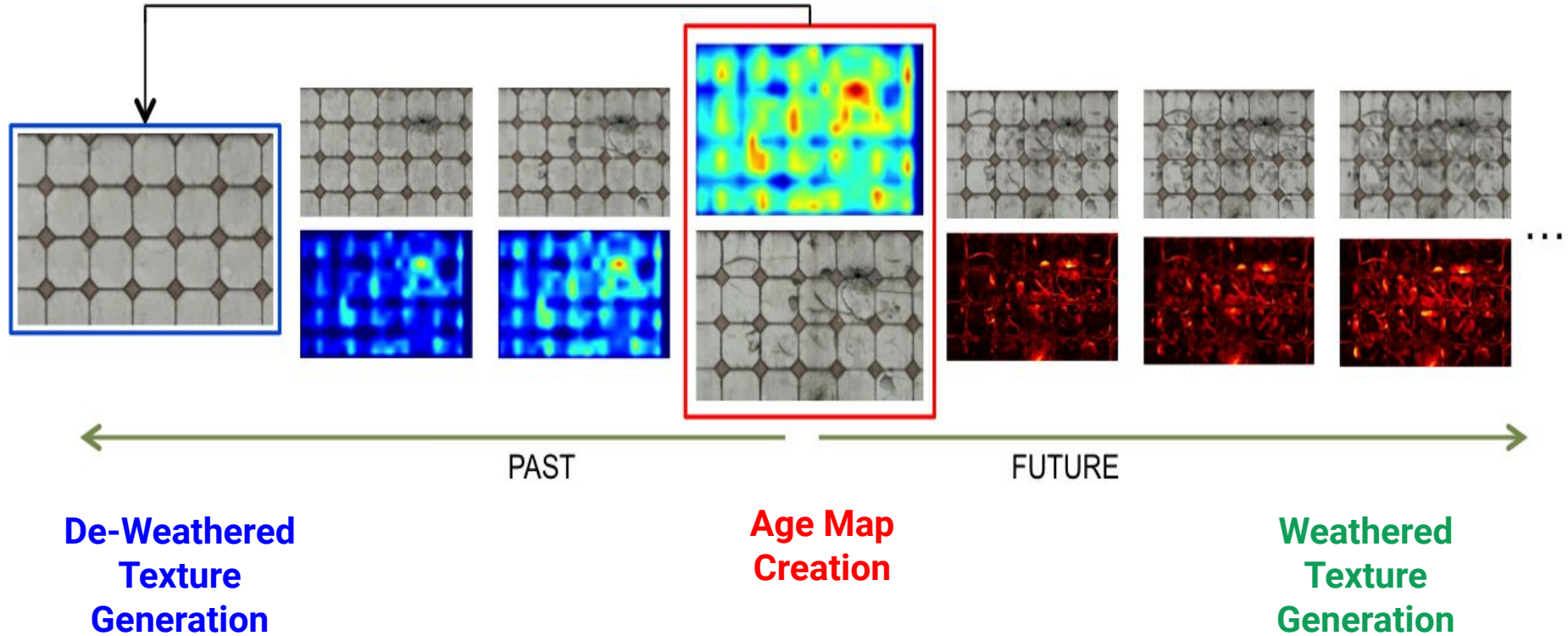
There are various Image processing techniques and algorithms involved in the process of texture generation.

The first part of creating an age map involves
- Spatial Convolution
- Image Gradient
- Nearest Neighbour Search

The Intact Texture Generation requires us to find potential tile centers(local minima from age map and further filtering to result in a grid which we can use to do Template Generation.

The concepts involved are :
- Convolution
- Detecting Regularity
- Tile Detection and Texture Reconstruction

The final Weathered textures are constructed by Synthesis of Weathered pixels by distances from age map.

Checkpoints

These are the major components of the project that we have to do.

The expected dates by which we are planning to finish them are mentioned alongside it.

Project Milestones & Expected Timeline

Milestone	Expected Dates	Duration Alloted
Paper Analysis	21 Oct	3 days
Age Map Generation	25 Oct	4 days
Tile Detection	30 Oct	5 days
Mid Evaluation	31 Oct	
Structured Template Generation	5 Nov	5 days
Stochastic Intact Texture Generation	10 Nov	5 days
Weathering and De-weathering	15 Nov	5 days
Results & Improvisation	18 Nov	3 days
Final Evaluation	19-25 Nov	

Progress

- We have completed the naive implementation of the Age Map. Currently it is taking a bit more time than expected on a relatively small input image. We are working on optimizing it.

- We are currently implementing tile detection and have made some progress. It should be completed shortly.

Distance Function:

$$D(P_i, P_j) = \frac{I(P_i, P_j)}{\max_{i',j'} I(P_{i'}, P_{j'})} + \frac{G(P_i, P_j)}{\max_{i',j'} G(P_{i'}, P_{j'})}$$
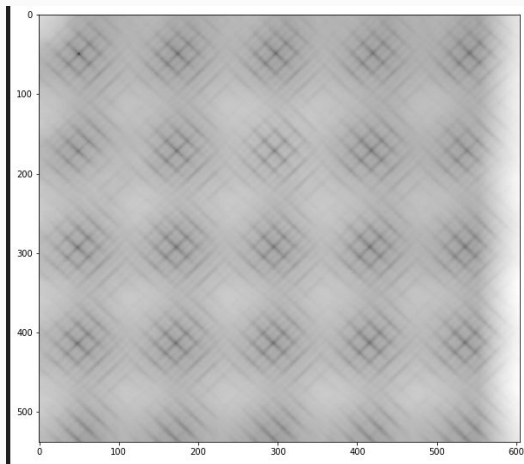
Source Patch:

Comparison Of Outputs

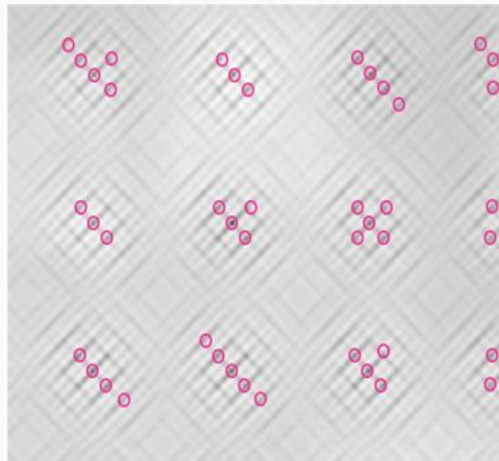We checked our output of distance map (one source patch) with that expected in the paper.

We see that the patterns produced are similar

(This is also used in Tile Detection)
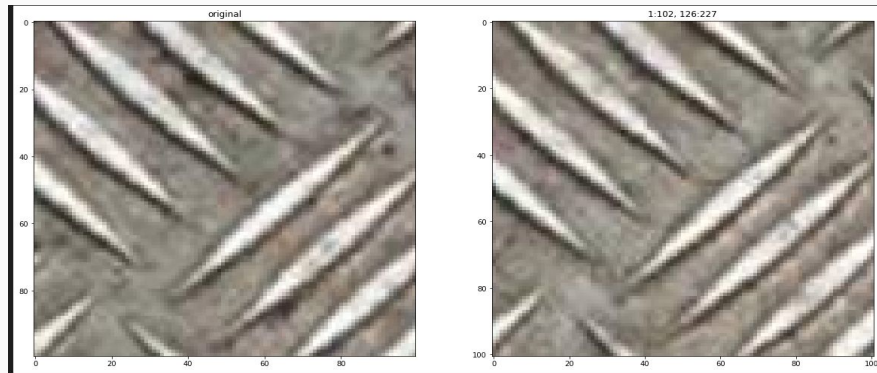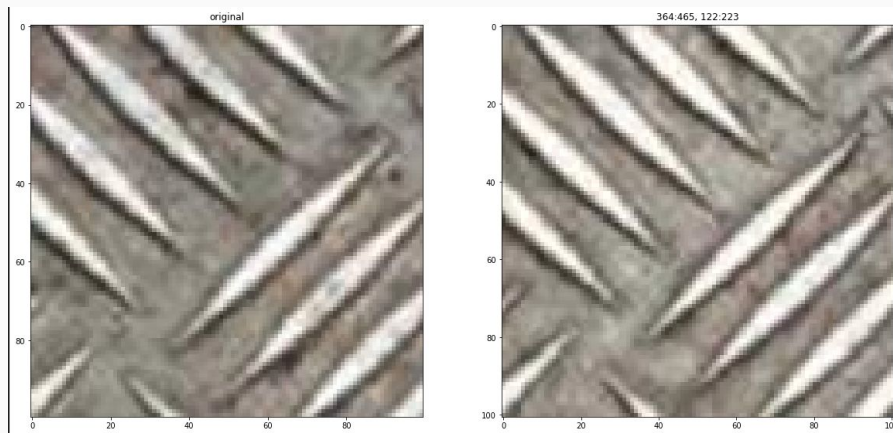
Our Output:

Output of Paper:

K- Nearest Neighbour

We took the source patch shown earlier as [0:100, 0:100] ,i.e., N=100

For the K nearest neighbour(in terms of dist between the patches) we are showing 2 of them [K=10]

Neighbour 1: [1:102, 126:227]

Neighbour 2: [364:465, 122:223]

Age Map

The color map we used is not similar to the one used in the paper and there are still some irregularities in the output which are in the process of correction

Our Age Map Output: