Texture Synthesis for Material Recognition

Master's Thesis in Articial Intelligence — Intelligent Systems

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Material Recognition

- The task of classifying single novel images to material classes
- Material models largely dependent on the intra-class variation of training data
- Data can be sparse/hard to obtain

ADD IMAGE

Texture Synthesis

- The task of creating synthetic images
- Different reflection models simulate different light behavior
- Models exist for global and local illumination

ADD IMAGE

Goal of this thesis

- Investigage how synthetic image data can support the field of material recognition
- What reflection models can be employed to obtain highly realistic synthetic data
- What are potential bottlenecks in the creation and usage of synthetic data

Textons & Filter Banks

Multivariate Gaussian Distributions

Minimal Training Images

Photometric Stereo

PhoTex Database

Generation of novel data

Local Reflection

Lambert's Cosine Law

Lambertian

Phong

Blinn-Phong

Cook-Torrance

Oren-Nayar

Two datasets

Experiment A

Experiment B

Results

Conclusion