FAKULTÄT FÜR !NFORMATIK
Faculty of Informatics

Diplomarbeitspräsentation

Comparision of Image Blurring Techniques on Modern Graphics Processing Hardware

Masterstudium:
Visual Computing

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Problem Statement/Motivation

The programmability of **modern graphics hardware** and its steadily increasing computational power makes the implementation of highly complex **image processing techniques** in real-time rendering viable. Especially the process of **blurring an image** is of interest for a lot of effects.
This work examined different image blurring techniques when realised using a **shading language** aswell as **general-purpose computing on graphics processing units (GPGPU)**. This is motivated by the increasing popularity for implementing special tasks like physics simulations using **GPGPU**.

Contributions

- Comparison of a broad range of **different filtering methods** in terms of quality and performance
- Comparison of **CUDA versus GLSL** regarding image filtering
- Creating a **guideline for graphics developers** who are interested in integrating image filtering in their application

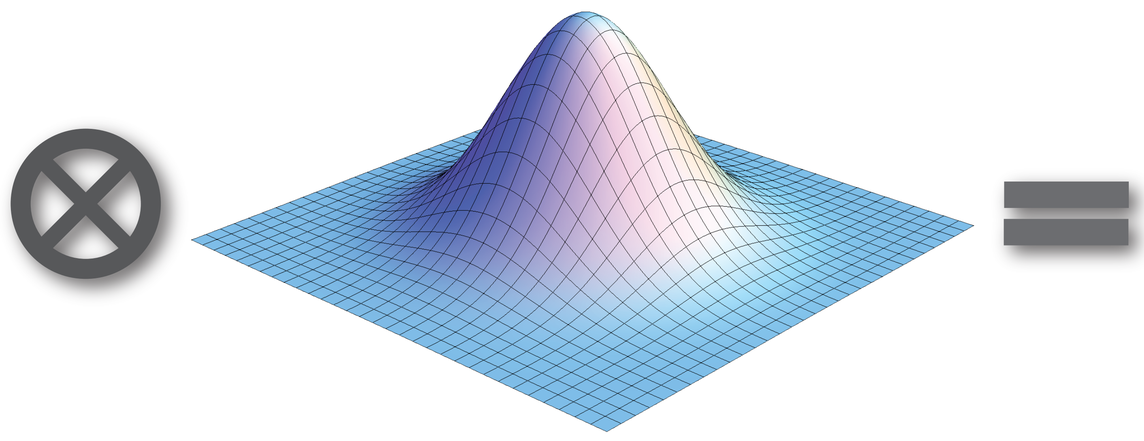


Illustration of the convolution with a Gaussian filter kernel

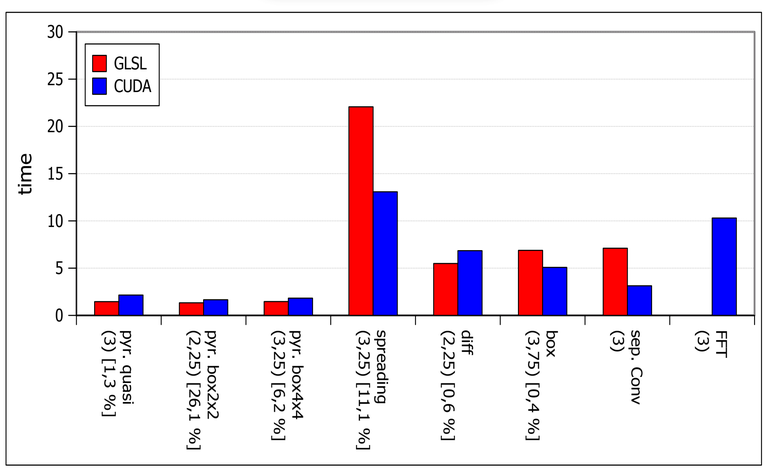
Results

- Discussion of the performance differences between GLSL and CUDA when varying image and filter size
- Determined **effective filter size** through automated process
- **Overall performance charts** based upon these results
- **Image quality** comparison using a visual metric (hdr-vdp2)

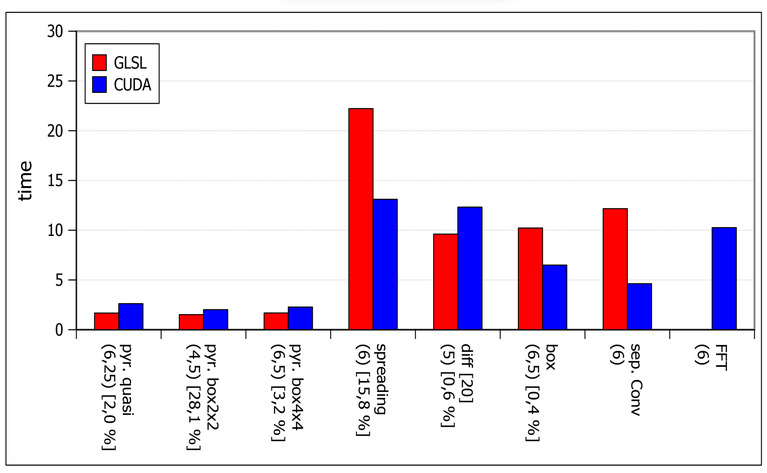
Conclusion

- **Pyramid methods fastest** but lowest control over filter size
- **Quasi-convolution** offers the **best trade-off between quality and performance** amongst the tested pyramid filters
- No clear winner between CUDA and GLSL
- Considerable **speed-up** of some methods through the usage of **CUDA shared memory**.

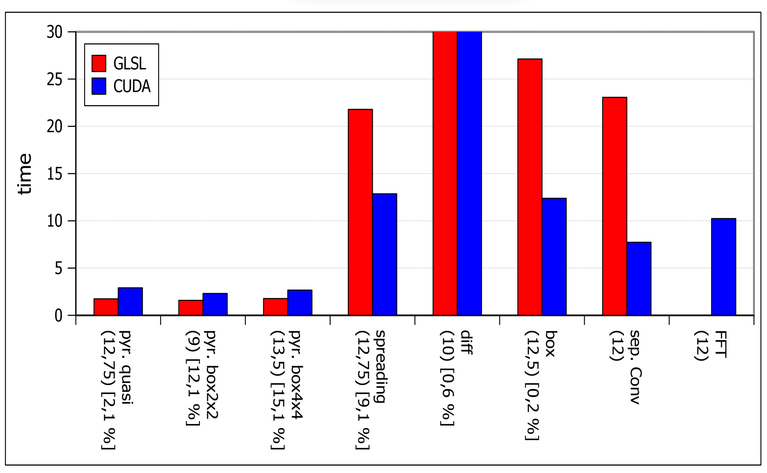
σ = 3



σ = 6



σ = 12



[ ] = probability of detection, compared to convolution ( ) = determined effective filter size σ

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