# Qualitative and Quantitative Analysis of Path Tracing Algorithm

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This documents goal is to present and analyse the results of the Path tracing program created for this assignment, below I will compare images generated via ray tracing with ones generated with path tracing.

These tests will be performed using an intel i7-6820HK CPU @ 2.70GHz. The images rendered will be 500x500 and will all have the same basic scene.
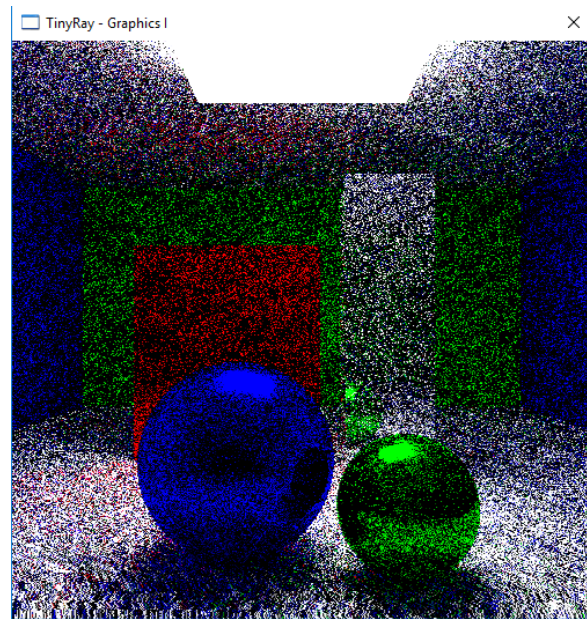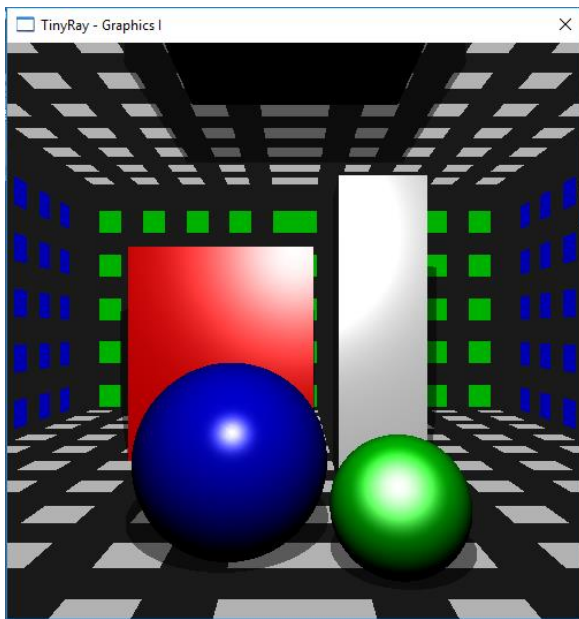
Above are 2 images, the left one is ray traced and took 0.14 seconds to render the scene calculates the shadows, diffuse lighting and the specular component. The image on the right is done using path tracing, and takes into account reflections along diffuse and emissive components. the path traced image was rendered using 10 samples per pixel and took 7.92 seconds to render, keeping that in mind we can see that path tracing is far less time efficient when compared to ray tracing.

In the above ray tracing image shadows are extremely sharp and unrealistic, while they convey the idea well they are not very realistic when compared to path tracing.

Given enough time and processing power path tracing can be far superior in terms of image quality compared to ray tracing below will follow some screenshots rendered using path tracing with different pixel samples
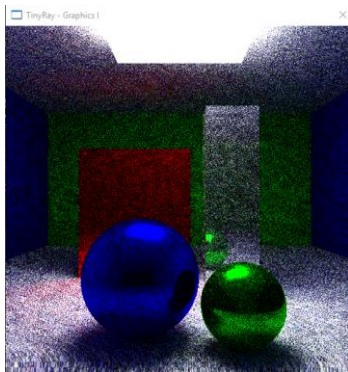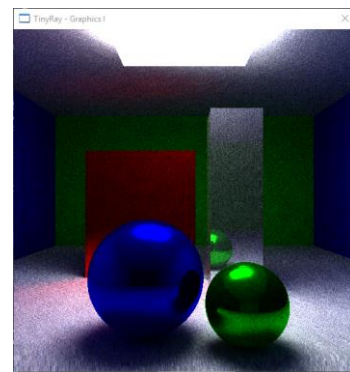

50 samples per pixel
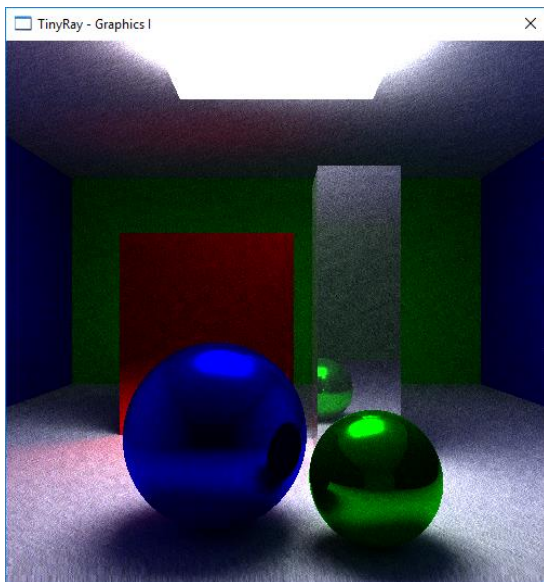
38.08 seconds
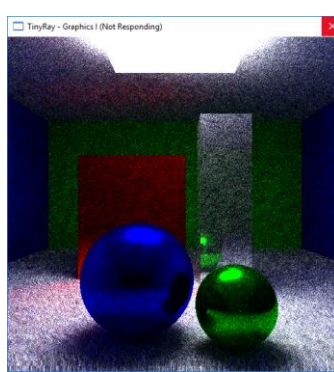
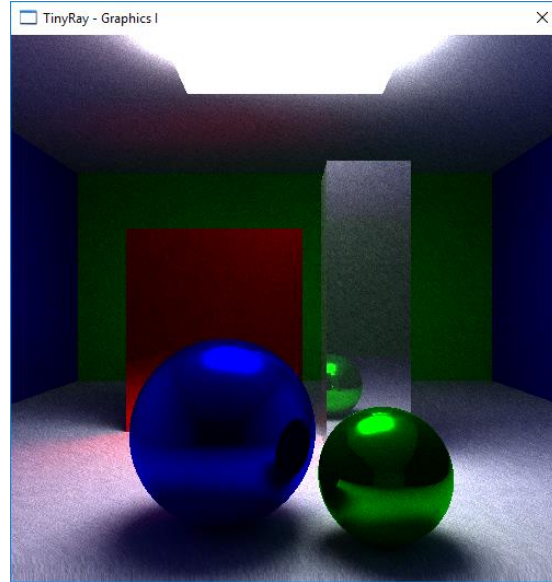100 samples per pixel

1m 13.25 seconds

500 samples per pixel

6m 11.20 seconds

1000 samples per pixel

12m 22.80 seconds

2000 samples per pixel

25m 5.30 seconds

As visible above given enough time and processing power path tracing can produce very realistic images but over 500 samples you get diminishing returns that peak around 2000 samples, anything over this takes far too long to render for virtually no gain in image quality at all.