Implementing BRDF in Setforge

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1 Objective

This project works on implementing bi-directional reflective distribution function (BRDF) into the Setforge to get realistic rendering of objects. Setforge is software used to generate image data sets for neural network training. Figure 1 shows an example ouptut of the setforge. It uses a object model and renders it in various poses to get distinct images for a data set. It originally used phong shader for rendering objects but, this project will work towards implementing BRDF for better results. Figure 2 shows a bunny rendered with phong shader.

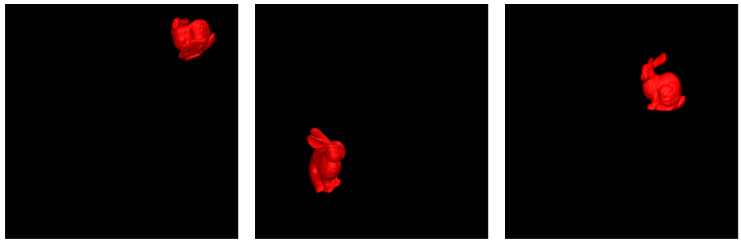

Figure 1: Output of Setforge

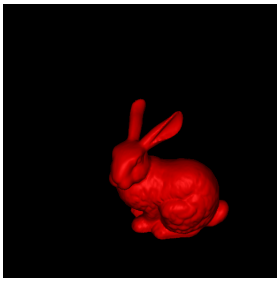

Figure 2: Bunny rendered with Phong Shader

2 User Interaction

This project can render a bunny using three different textured-BRDFs namely, iron, wood, copper and painted metal. The user can give different commands to select between the three available materials. This project comes with four different .bat files; each of which are set to choose one these textured-BRDFs. The user can directly start these files see the results of this project. Figures below show the results of these textured-BRDFs.

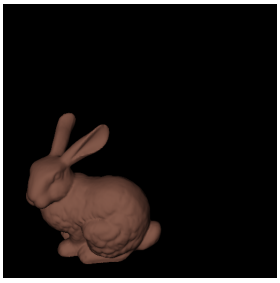

Figure 3: textured BRDF for Copper

Figure 4: textured BRDF for wood

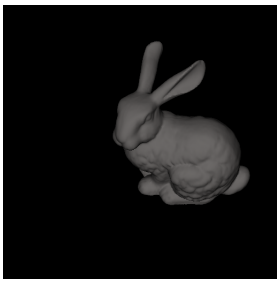

Figure 5: textured BRDF for Iron

Figure 6: textured BRDF for Painted Metal

3 Feature details

This project uses a point light and a spot light to illuminate the object that is to be rendered. As mentioned in the user interaction section, this project uses texture-BRDF to render objects. Although it also uses environment mapping, the object in question is not reflective enough to make environment map visible on the object but, It does change the appearance of the object quite a bit. Figure 7 features an object with same properties as figure 6 save the use of environment mapping.

Figure 7: Painted Metal with environment mapping

4 Challenges ahead

Although Environment mapping is used, the image database used to train a neural network needs diversity for better training. It can be done to get even better results but, this project needs BMP images to use as textures which can be later used for environment mapping. Another challenge will be to collect all the BMP images. Image Generator is the stage 2 of setforge that uses 15,000 images to blend with all the rendered images in stage 1. This large number of images serve to give good diversity to resultant images hence, they are good to be used as training images for a Neural Network. BMP images inherently have huge size and 15,000 images would consume a large chunk of memory

of the computer but, first and foremost, building such a database will take a considerable amount of time.

5 Conclusion

A comparison can be drawn between original setforge and BRDF implemented setforge based on the results obtained. The object rendered by BRDF implemented setforge are clearly more realistic. A more realistic image could train a neural network to recognize real-life objects with higher accuracy without a need for preprocessing. Hence, it can be concluded that using BRDF is more viable to use for rendering objects using setforge than phong shader.