Summary of Comments on 10.21105.jcon.00031 (1).pdf

Author: snoeyink   Subject: Sticky Note   Date: 7/9/2019 2:37:21 PM
The package title mislead me: I was expecting a RayTracer, which solves a graphics problem, but the author's emphasis is on inverse graphics (a form of scene understanding.) I'd suggest adding to the paper title: RayTracer.jl: A Differentiable Renderer that Supports Parameter Optimization for Scene Reconstruction.

Author: snoeyink   Subject: Sticky Note   Date: 7/9/2019 2:41:32 PM
This paper introduces a raytracer built in Julia that allows the Zygote Automatic Differentiation tool to compute gradients of parameters. One can then optimize parameter values for scene understanding or reconstruction.

The examples shown are toy experiments of obtaining camera or light parameters to match a rendered image. They demonstrate that the combination works, which is good.

I would like to see some discussion of more interesting parameters, such as determining material properties from images. And more on limitations: determining geometry seems out of reach because there are so many discrete choices: the problem is not differentiable.

How fast is the gradient computation after AD? (How fast is the AD?) How do these grow with scene complexity?

Author: snoeyink   Subject: Highlight   Date: 7/9/2019 4:17:40 PM
The abstract really threw me for a loop -- it starts out like it is for a completely different paper. You will not be doing any experiments that demonstrate significant training speedups, so that should not be the start of the abstract.
I suggest something like this:

In this paper we present RayTracer.jl, a renderer in Julia that is fully differentiable via Zygote.jl. This means that RayTracer not only renders 2D images from 3D scene parameters, but it can be used to optimize for model parameters that generate a target image in a Differentiable Programming (DP) pipeline. We interface our renderer with the deep learning library Flux for use in
combination with neural networks. We demonstrate the use of this
differentiable renderer in rendering tasks and in solving inverse graphics problems.

Author: snoeyink   Subject: Highlight   Date: 7/9/2019 4:05:49 PM
This is somewhat repetitive.

Author: snoeyink   Subject: Inserted Text   Date: 7/9/2019 4:24:13 PM
are
[better: avoid passive:: However, real-time rendering use algorithms like rasterization.]
You provide rasterization, too, so this way of presenting the background is strange. Most of this background is said elsewhere, so I'm not sure you need this section. Move the content into the next.

Author: snoeyink   Subject: Cross-Out Date: 7/9/2019 4:25:24 PM
You haven't mentioned path yet, so "the path" confuses.

Author: snoeyink   Subject: Cross-Out Date: 7/9/2019 4:25:02 PM
The ray is from the eye, so calling it a ray of light is confusing.

Author: snoeyink   Subject: Highlight   Date: 7/9/2019 4:17:56 PM
You don't demonstrate any complex rendering tasks.

Author: snoeyink   Subject: Inserted Text   Date: 7/9/2019 4:26:35 PM
was Technique -- don't change terms.
Ray tracing is computationally expensive

Author: snoeyink   Subject: Highlight   Date: 7/9/2019 4:30:32 PM
You are changing terms
computationally expensive = compute intensive
operation = technique?
And are you going back to general rendering or still referring to ray tracing?

Since rendering is computationally expensive, it is generally programmed in static languages like C++, making software development time expensive. Static languages also lack support for

Author: snoeyink   Subject: Highlight   Date: 7/9/2019 4:31:18 PM
antecedent of these (plural) is unclear, since you've only named one, C++.

Author: snoeyink   Subject: Sticky Note   Date: 7/9/2019 2:39:42 PM
These plots take far too much space for the small amount of data they contain.

Why is the number of pixels the measure? I'd expect it to be number of mesh elements.

Author: snoeyink   Subject: Cross-Out Date: 7/9/2019 4:33:36 PM

Author: snoeyink   Subject: Cross-Out Date: 7/9/2019 4:34:39 PM

Author: snoeyink   Subject: Cross-Out Date: 7/9/2019 4:37:08 PM
This note does not seem to fit here, though, since this is about the user. Move to the end of the previous paragraph.

Author: snoeyink   Subject: Pencil   Date: 7/9/2019 4:36:07 PM

Author: snoeyink   Subject: Inserted Text   Date: 7/9/2019 4:35:43 PM
s

Author: snoeyink   Subject: Inserted Text   Date: 7/9/2019 4:37:24 PM
currently support one

Author: snoeyink   Subject: Pencil   Date: 7/9/2019 4:37:44 PM

Author: snoeyink   Subject: Cross-Out Date: 7/9/2019 4:37:36 PM

Author: snoeyink   Subject: Highlight   Date: 7/9/2019 3:12:05 PM
Lose the brackets for Fig, Listing, Alg references, because it leads to ambiguity between them and references.

It is confusing to have Listing 1 and Algorithm 1; make them Algorithm 1 and Algorithm 2.

Author: snoeyink   Subject: Highlight   Date: 7/9/2019 4:38:50 PM
This is an experiment that you have not described with enough detail to be replicated. What is the scene? Why is pixels the measure of complexity? (And why is so much memory being allocated?)

Also, lose the [] around figure numbers.

Author: snoeyink   Subject: Cross-Out Date: 7/9/2019 3:58:28 PM
stay in present tense

Author: snoeyink   Subject: Cross-Out Date: 7/9/2019 3:58:16 PM

Author: snoeyink   Subject: Cross-Out Date: 7/9/2019 3:58:49 PM

Author: snoeyink   Subject: Cross-Out Date: 7/9/2019 3:59:56 PM

Author: snoeyink   Subject: Cross-Out Date: 7/9/2019 3:58:56 PM

Author: snoeyink   Subject: Inserted Text   Date: 7/9/2019 3:59:12 PM
readers

Author: snoeyink   Subject: Highlight   Date: 7/9/2019 2:54:37 PM

Author: snoeyink   Subject: Inserted Text   Date: 7/9/2019 4:00:48 PM
then

Author: snoeyink   Subject: Highlight   Date: 7/9/2019 3:51:44 PM
Writing tip: Find and strengthen parallels. If you use the exact same sentence structure and word choice when you compare or contrast, then the essential differences will pop out:
The rendering problem is to project 3D scene parameters to form an image on a 2D plane; the inverse rendering problem is the opposite: mapping from the 2D image back to the parameters of the 3D scene.

Using the same words for the same concepts conserves the reader's energy for sorting out your ideas.

Author: snoeyink   Subject: Inserted Text   Date: 7/9/2019 3:13:24 PM
Listing (be consistent.) Actually, make this Algorithm.

Author: snoeyink   Subject: Pencil   Date: 7/9/2019 3:53:12 PM

Author: snoeyink   Subject: Cross-Out Date: 7/9/2019 3:51:44 PM

Author: snoeyink   Subject: Cross-Out Date: 7/9/2019 3:51:59 PM

Author: snoeyink   Subject: Inserted Text   Date: 7/9/2019 3:52:55 PM
problems (there is not one problem, but many, depending on the parameters you choose to solve for.)

Author: snoeyink   Subject: Inserted Text   Date: 7/9/2019 2:54:37 PM
with respect to

Author: snoeyink   Subject: Inserted Text   Date: 7/9/2019 3:54:41 PM
Algorithm 1 (will be Algorithm 2 if you take my previous advice.

Author: snoeyink   Subject: Highlight   Date: 7/9/2019 3:58:14 PM
It is essential that enough detail is given in experiments that they can be replicated.

Author: snoeyink   Subject: Highlight   Date: 7/9/2019 3:56:34 PM

demonstrate that we can use AD gradients to recover camera or lighting parameters for a scene.

Author: snoeyink　　Subject: Highlight　Date: 7/9/2019 3:45:55 PM
It is unfortunate that the aspect ratio changes in the image from b to c.　Can you fix that?

Author: snoeyink　　Subject: Inserted Text　　　　Date: 7/9/2019 3:56:54 PM
2

Author: snoeyink　　Subject: Inserted Text　　　　Date: 7/9/2019 3:56:48 PM
Algorithm 2

Author: snoeyink   Subject: Inserted Text   Date: 7/9/2019 3:43:49 PM
As our loss function, we use the mean squared difference between rendered and target images, each with 512x512 pixels having fractional RGB values.
We minimize loss with the Adam optimizer, with learning rate 0.05, and declare the model to have converged if loss falls below 10.

[There is no need to switch to passive voice.]

Author: snoeyink   Subject: Highlight   Date: 7/9/2019 3:32:46 PM
To be able to replicate, or to understand what 10 means, I need to know more about your loss function. How many pixels? What color space are you using? Are colors integers or fractions?

Author: snoeyink   Subject: Highlight   Date: 7/9/2019 3:21:44 PM
To replicate this experiment one needs the details of how many lights and lighting parameters were used.

Author: snoeyink   Subject: Highlight   Date: 7/9/2019 3:09:42 PM

Author: snoeyink   Subject: Inserted Text   Date: 7/9/2019 3:05:51 PM
Julia

Author: snoeyink   Subject: Highlight   Date: 7/9/2019 3:09:31 PM
"the problem" is not well defined -- if the problem is "inverse graphics" then there are many non-differentiable decisions in creating a model...

Author: snoeyink   Subject: Highlight   Date: 7/9/2019 3:08:11 PM
Is the pipeline the system? The system is not defined, and the previous use was about Julia making fully differentiable systems.

Author: snoeyink   Subject: Inserted Text   Date: 7/9/2019 3:19:30 PM
{SSA}

Author: snoeyink   Subject: Highlight   Date: 7/9/2019 3:18:50 PM
complete this entry.

Author: snoeyink   Subject: Inserted Text   Date: 7/9/2019 3:17:54 PM
{M}onte {C}arlo will keep the capitalization in bibtex.