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Computer Graphics I (COMP 4270)
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Intentions
This document is a summary of my findings in reading a paper from the graphics world. After selecting a source they used in the paper I'm intended to convey how the papers relate to each other. This time I'm reading a paper called "Portrait Lighting Transfer Using a Mass Transport Approach"

The paper start with a problem that is trying to be solved an then explain their approach to solving the problem. The researchers are trying to make lighting portraits easier. They explain the expense that goes in to get the lighting just right for a photo. They also point to the image touch up. What they propose it given an image with the desired lighting remap another with that lighting. They refer to other research done on similar topics for example single image relighting for face recognition where they conflate reference material to allow the system detect the same key features in different lighting conditions. What they do is different in a few ways, first they place a generic mask over the face of the input. The system builds the position and three dimensional bump and solves mass transport on the model. This results in an image of the input subject with lighting and shadow of the reference. |

I had to look up mass transport to learn more of what is going on they explain their solution this is a good chance to look up a reference. I found "Displacement Interpolation Using Lagrangian Mass Transport" It's a paper based on several technologies that come together in an interesting way. It uses a gradient decent algorithm, the basics of how to do calculus in a computer. Mapping one equation on another. In this case they are using lighting data In it describes how you can take lighting data and the underlying 3d model and move the lighting source. The underlying principal is you blend the lighting data of two images. They show that this is not often results in unrealistic outputs where there are holes or just incorrect shadows using just linear interpolation. Using a network you can pass the references in and have it solve for the mean bringing the interpolation closer to a single result instead of a blend between the two.

The similarities between the success of the papers is the idea of playing with lighting in the image based on histograms that hold transformation. In this way they are different the 2011 paper conflates two images blending in details from a lighting reference. They focus on the entire image which is amazing for scenes or solving cross frames but they are limited by this fact too. They also had a hardware limitation making this less potential useful in how expensive it is. The 2017 paper takes this Idea and applies it to a very specific region. In this case a face defined by a mask. The face mask provides the required domain specification that the 2011 paper stated was missing from the linear interpolation. While the transform applies to the entire image the algorithm builds it's lighting model from the face. This technique was derived to reduce or eliminate artifacts. This currently requires the user to select the face and often apply masks if non-facial data like a hat or died hair has bleed into the result. It was the 2017's paper to fix form my observations unbalanced lighting conditions. It handles saturation very well when colors in the reference apply well to the result but struggles when the colors or contrast are high value solids that don't contribute to the lighting.

Portrait Lighting Transfer Using a Mass Transport Approach

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@article{Shu:2017:PLT:3151031.3095816,
 author = {Shu, Zhixin and Hadap, Sunil and Shechtman, Eli and Sunkavalli, Kalyan
and Paris, Sylvain and Samaras, Dimitris},
 title = {Portrait Lighting Transfer Using a Mass Transport Approach},
 journal = {ACM Trans. Graph.},
 issue_date = {January 2018},
 volume = {37},
 number = {1},
 month = oct,
 year = {2017},
 issn = {0730-0301},
 pages = {2:1--2:15},
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 url = {http://doi.acm.org/10.1145/3095816},
 doi = {10.1145/3095816},
 acmid = {3095816},
 publisher = {ACM},
 address = {New York, NY, USA},
 keywords = {Face relighting, histogram matching, mass transport},
}
```

Displacement interpolation using Lagrangian mass transport

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@article{Bonneel:2011:DIU:2070781.2024192,

 author = {Bonneel, Nicolas and van de Panne, Michiel and Paris, Sylvain and
Heidrich, Wolfgang},
 title = {Displacement Interpolation Using Lagrangian Mass Transport},
 journal = {ACM Trans. Graph.},
 issue_date = {December 2011},
 volume = {30},
 number = {6},
 month = dec,
 year = {2011},
 issn = {0730-0301},
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 articleno = {158},
 numpages = {12},
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 publisher = {ACM},
 address = {New York, NY, USA},
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