

William Alizio

Literature review 1

91.427

10/20/2010

Main article: The Digital Emily Project: Achieving a Photorealistic

Digital Actor (IEEE Computer Graphics and Applications July/August 2010 pages 20-31)

Secondary article: Acquiring the Reflectance Field of a Human Face (SIGGRAPH 2000 Conference Proceedings pages 145-156)

The basic idea of the main article is to make a digital representation of a human being so realistic that one cannot tell the difference between the digitized version of an actor and the actual actor in a video clip. It focuses on how to represent the face digitally and did not go into detail on how to do the rest of the body, but I believe the same techniques can be used to achieve that as well.

The secondary article explains a technique for acquiring the reflective properties of a human face, which is a subset of what the main article is trying to achieve. They took over 2000 separate images of the test persons face corresponding to varying amounts of light from different sources and directions while the person sat as still as possible. What was captured using these images was how each individual pixel reflects light in reality so that once an artificial light source is introduced digitally later on it will reflect light in the same manner and hence make it look realistic. What's interesting is this article was written 10 years prior to the main article that references it and in the end there is a section about how things could be improved upon. In particular it says, "Future work could characterize these effects and integrate them into a facial animation system; part the acquisition process could be to capture the reflectance field of a person in a variety [of] different expressions." (page 155) This is exactly what they did for the Digital Emily Project: they captured the reflectance field in 40 different facial expressions and used this info to animate a photorealistic version of her face. The secondary article also mentioned that the process could be sped up if they had higher-speed cameras: well in the Digital Emily Project their captures took 3 seconds each. It shows the progress that has been made through faster and newer technology over the past decade. Not quite in real-time yet but we are getting there.

The main article goes into detail how they get from the digital photos of Emily to the finished product. It tells how the original photos capture a mesh a few million polygons and they reduce that to 4000 to be able to process all the geometry. A lot of what was described relates to

our Graphic I course. For example data loss, the visual information in the real world is infinite and we can only capture so much, but also we do not need to capture that much yet because we do not have high enough resolution screens for the extra detail to matter. An example of this type of photo-realistic actor is the movie *The Curious Case of Benjamin Button* where they portray Brad Pitt as an elderly man. The face is the only digital part, which they superimposed over another elderly actor walking around; interesting stuff! Also in the matrix trilogy movies the 2nd and 3rd movie they use a similar technique. It's interesting how this article is basically claiming that no one can tell the difference between the digital image and the real thing using their process, however, in my opinion it's not complete yet since it's only the face. I am wondering why they do not do this for the full body. Will it be too much work? Are there added difficulties not mentioned? If they did do the full body, would it be just as photo-realistic? My guess is no since there are a lot more mechanics involved in walking and jumping and crawling or whatever other random movement we can do than just simple facial expressions. I'm not saying it is impossible but based on this article it seems there is still a ways to go.