2a. The computing innovation that is represented in my artifact is the animation software Houdini, which is used to blend hand-drawn animation with CGI. The purpose of the animation software Houdini is to store data and render hand-drawn ink lines onto the 3D character model without being anchored onto the actual character, thus reinventing the CGI and 2D animation mashup style to create an expressive animated film [5]. The artifact itself shows a comparison between the Disney animation software, Meander, and Sony Pictures Animation animation software, Houdini, with images from *Spider-Man: Into the Spider-Verse* and the Disney animated short-film *Paperman* [4].

2b. The program that I used to create the artifact was in Google Draw. I uploaded several images of my choosing from the computer and went to insert and uploaded the images that I required for the artifact that represented the software, the computing process of the animation software, and the final product. I then used the text box icon to write simple explanations of the animation software and what did they in contrast of one another that are illustrated in my artifact as well as adding color to the text box by using the bucket icon on the menu bar.

2c. A beneficial effect of the the new animation innovation that was created by Sony Pictures Animation software is that it created a huge boost in the economy due to the amount of money that the movie brought in which was about a total of $372,652,506 [7] because of the unique and groundbreaking animation style that appealed to the audience. Also, the entertainment industry is a major part the economy, and since the innovation was quite popular among the audience and critics it has the potential of bringing in more profit from future animated films thus further boosting the economy.

However, a harmful effect from the ingenious innovation is that the animation has powerful strobes of light and strong flashing patterns which can affect people that suffer from seizures, epilepsy, migraines or other chronic illnesses due to the intense visual images that are portrayed in the film which can potentially harm citizens in the society. [1]

2d. The animation software uses scan images software to store data analysis of hand-drawn strokes that is processed through a python program known as Sklearn which is tightly interacted with Houdini and process the data before adding them to the algorithms. Houdini inputs data which is applying a set of data to simulation objects, or to another set of data is by supplying a node to the objects or data that will have new data attached to them and for the output the software will attach objects or data input to a node and send it through a single output, but with new data attached.

The objects or data input to this node are sent through the single output, but with their new data attached [5]. The data stores the geometry of the hand-drawn stroke into the animation software by scanning the data analysis which allows data manipulations and adjustments to the hand-drawn stroke if needed when the CGI character moved. In order for hand-strokes to be adjusted as the CGI model moved when needed a custom GUI was “executed in Python scripts to create, destroy, reconnect nodes, change tools and ‘hop’ around the network automatically” [8]. While Houdini is an exceptional animation software to create detailed and complex animations, the animation software has the tendency of not being able to transfer data or store data analysis such as geometry and algorithms information of a 3D character model or import animated clips from other animation software like the software Maya [8].

2e.

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