**1a)**

Its better to use Simulators in generating datasets. The judgments were based on the following factors:

**Speed:** the process of generating datasets of grasp attempts is way faster with simulators than with physical robot arms which would require significant time, effort, and resources to collect through physical experiment.

**Safety:** its safer to generate grasp attempt datasets with simulators too, its entirely safe to generate datasets with a computer simulator, the worst that can happen if there is an error with the robot is that the computer becomes slow. That’s not a safety issue compared to the hazardous damages that could happen to humans and animals if a real arm goes wrong while trying to generate the dataset.

**1b)**

* Occasionally I noticed that the objects moved through the floor while the gripper tried to get a grasp of it.
* In few occasions I noticed that the object maintained an unstable position on the x,y plane that would be considered unrealistic in real life.

**2b)**

The two pathways are important in incorporating both local and global information into the prediction process. The higher resolution pathway may be better suited for capturing local, fine-grained details about the objects being grasped like: the shape, size, position and orientation of the object within the camera frame, and the geometry of the grasp itself. Global information may be important in scenarios where there are multiple object up for grasp, or if there objects are placed in a a space with rigid obstacles that also look like graspable objects.

**3a)**

The validation loss curve is more noisy when compared to the training loss curve because the validation data is a smaller subset of the overall data, and its used less frequently during training. This causes grater statistical variability.

**3b)**

It is very possible that the model predicts a valid grasp location and yet interpret a high validation loss term. This is because, the validation loss is drawn from the same training data, so rather than give a good indication of how well the model will perform on unseen data, its better at preventing overfitting the training data. Also the loss function used while training the data might not perfectly capture the performance metrics defining the network’s ability to predict grasps locations successfully.

**3c)** I achieved a 40% success rate averaged over all 50 attempts. I noticed that in the dataset, the objects were axis aligned as opposed how arbitrary they were placed in the evaluation simulator.

**4b)** The new success rate attained was 50%

**4c)**

**Image transformation:** flipping , scaling, cropping, shearing, and rotating are different possible transformation that could be applied to the image to change the appearance of the object in the image.

**Gripper rotation:** rotation of the gripper around its axis by a certain angle to simulate different grasping orientations.

**pixel location transformation:**  we can randomly shift the pixel location of the object and the gripper within the image.