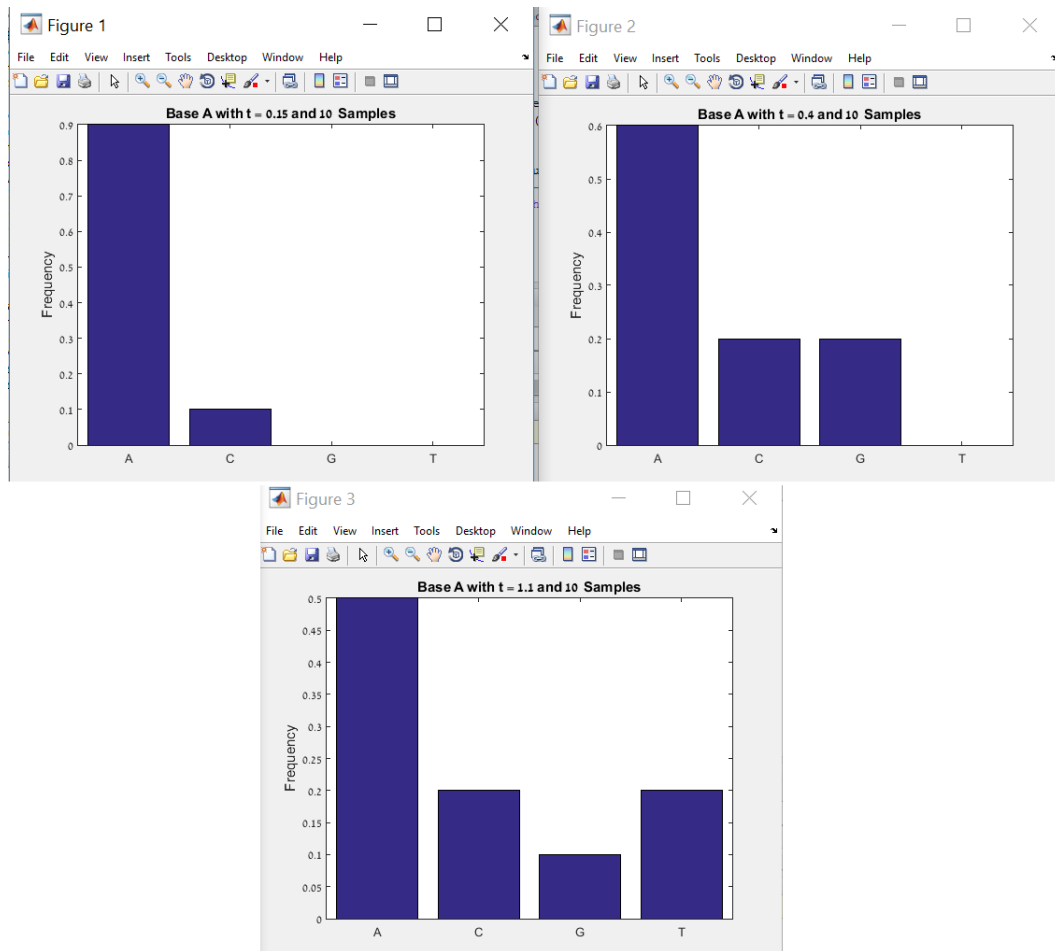


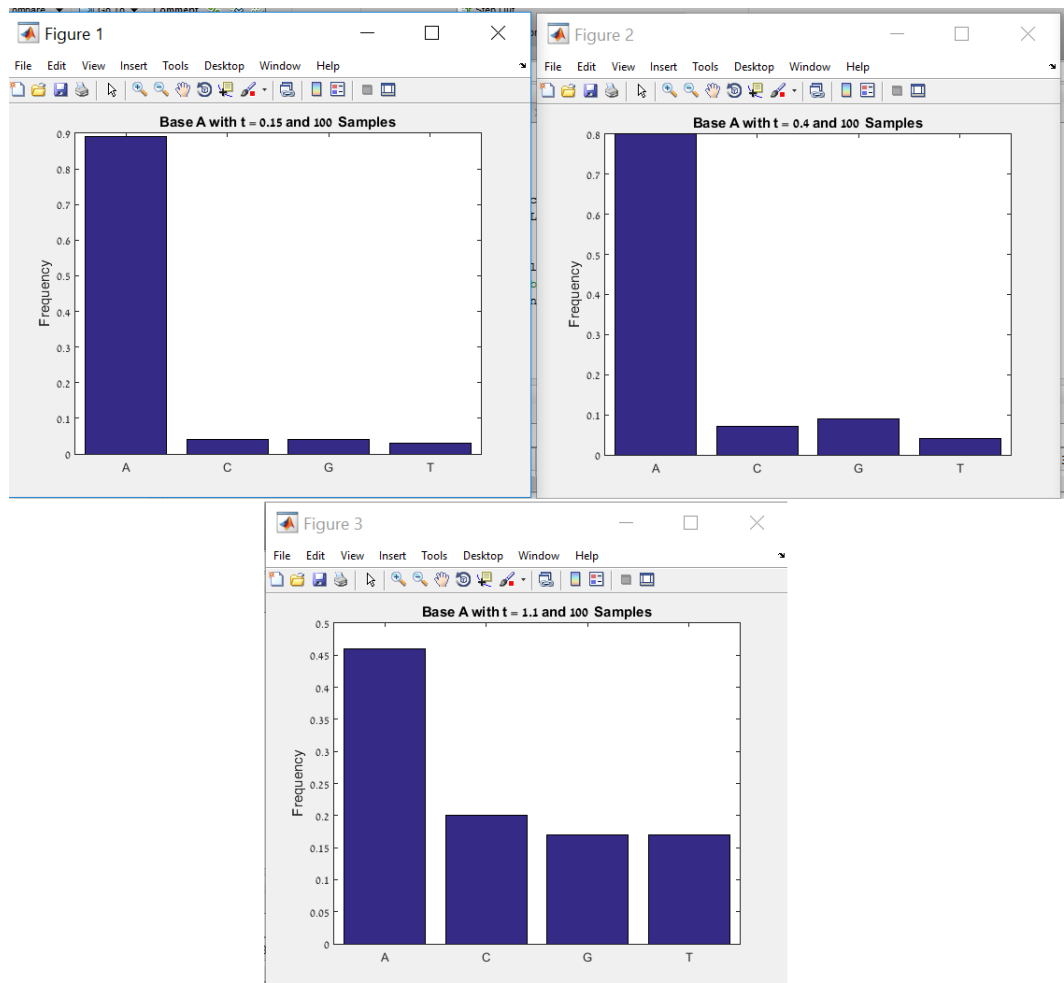
Ex3 - Lior Ziv 305742611

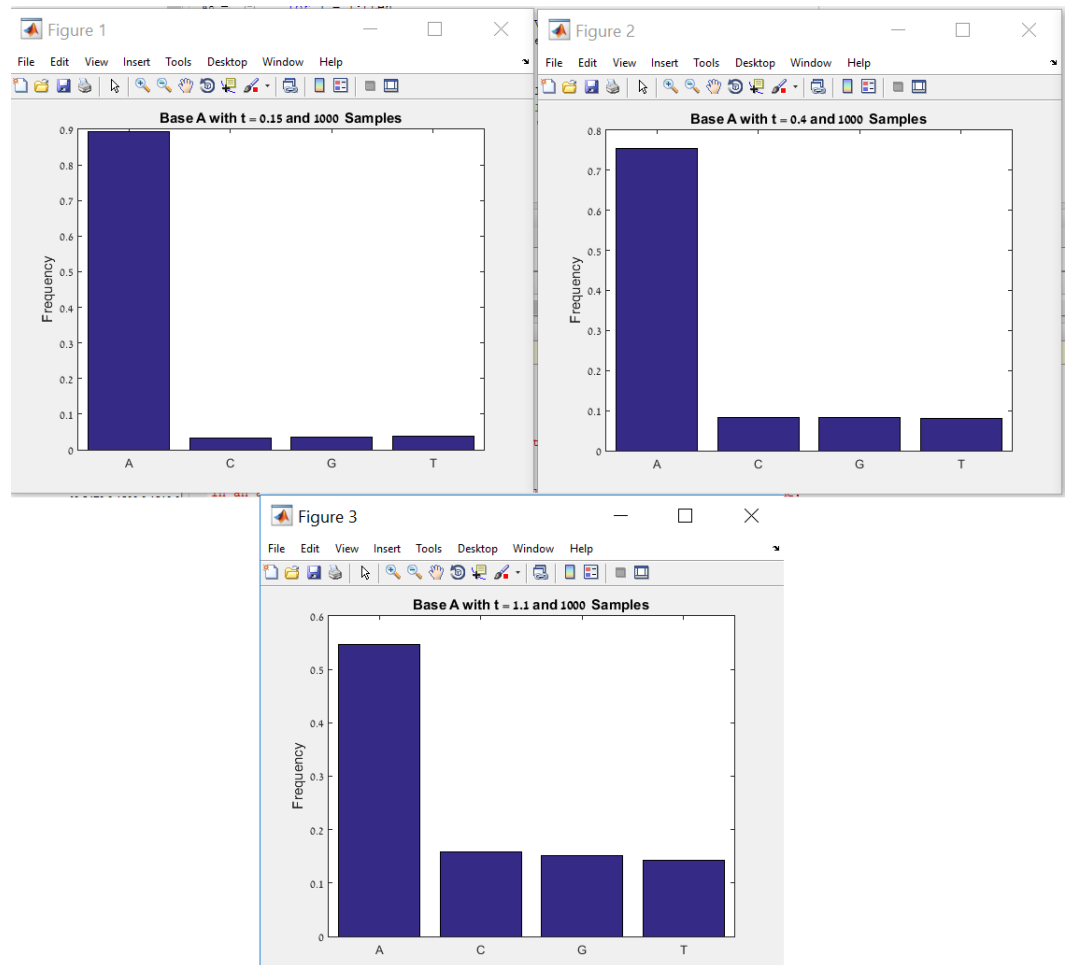
- Building a sampler for a branch

we can see as that for a specific letter the probability for it to move to the same letter is bigger than the probability of it to move a different letter, which fits the the Jukes - Cantor model.

Moreover we can see that as distance gets bigger (t gets bigger) the variance is greater which also makes sense, since the letter can change more when the distance increases, in the same manner as the samples size increase we get more accurate estimation which we can see is better in 1000 in compare to 10 samples(more samples gets us close to the expectation).

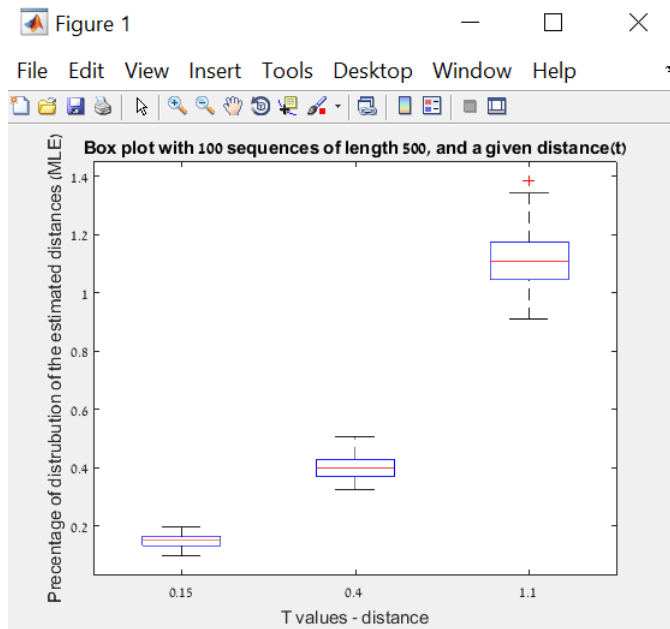






- **Estimating the evolutionary distance**

As the measured distance (represented by t) is getting bigger we can see as before that the variance is getting bigger, we also see the mean which is represented by the red line in each box is also very close to the original t value. So as t gets bigger in order to assess correctly we need more repeats (greater M), which means that as a tree grows bigger we have more work to do and by that the distance-based reconstruction will take longer as the tree is bigger.



- **Quad-trees**

As the graph here represents, the reconstruction success is 100%, which might make sense due the the size of the tree(only 6 nodes) or the similar magnitude in alpha and beta.

