

Progress Report: (Week of June 26)

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1 Samuel's Accomplished Tasks

1.1 Added Randomized Sign for v_R and v_z in `Sample_V_On_Set`

I realized that the reason fractional error is so large is that v_R and v_z have a mean of zero due to steady state. By averaging them in the function, it is not right because it decreases the standard deviation. Also, by interpolating, we miss the fact that the numbers are 50% of the time positive and half the time negative. So I changed `Sample_V_On_Set` such that it only average v_T a few times before putting them into interpolation. v_R and v_z only get sampled once and their signs get randomized.

1.2 Came Up with Using KS Statistics Test For `Sample_V_On_Set`

Although fractional error works well with v_T if repeated a few times, it is still bad for v_R and v_z since those are random numbers scattered around 0. So I test the result of v_R and v_z of `Sample_V_On_Set` by putting a real v_R generated by `sampleV` and a set of v_R generated by interpolation. Then I put those two sets in to a KS statistic test to see whether it can tell they are from the same parent distribution. The higher the p-value, the better because it is harder for KS to tell the difference. We are currently aiming for a p-value of 0.7.

1.3 Main Program Cluster and Plot

Combined Michael's Kmeans program with the main program into `main_program_cluster`. Now it takes a large samples, use kmeans to get some representatives (currently 1%), and then evaluate dot products on them. It then generates a 3 dimensional scatter plot of the maximum absolute value of dot product. So far, trying a few thousands stars with Gaia, it seems the dot product are nowhere near zero. They average at around 0.6.

1.4 Retested Fake Density

Due to failure in showing our program can distinguish no I3 with Dehnen df, we suspect either KDE, mock data generation, or main program is wrong. Using the main program cluster, I tested the fake density again, which is a deliberate density function that has no I3. I plotted the result and to our relief, all of the dot products are at 0. So this proves that the main program works just fine.

2 Ayushs Accomplished Tasks

3 Michael's Accomplished Tasks

3.1 Incorporated STD option

Wrote a function in tools to apply a variable STD cut to and 6D sample. We are thinking of using a 3 STD cut.

4 Mathew's Accomplished Tasks