**1. Tabulate the execution times of each of the individual approaches for computing distance in Python (i.e., run the shared code on your computer, note the times, and tabulate them).**

|  |  |
| --- | --- |
| Using For Loop | 0.011 seconds |
| Using apply function | 0.006 seconds |
| Using vectorization | 0.001 seconds |

**2. Next, replicate the for-loop based approach (the first one) and two different ways to make that version more efficient, in R. Profile these three approaches, and tabulate the results**.

|  |  |
| --- | --- |
| Using For Loop | 0.000187 seconds |
| Using apply function | 0.000439 seconds |
| Using vectorization | 0.000024 seconds |

**3. Based on the computational efficiency of implementations in Python and R, which one would you prefer? Based on a consideration of implementation (i.e., designing and implementing the code), which approach would you prefer? Taking both of these (run time and coding time), which approach would you prefer?**

The assessment of performance along with programming time shows R emerges as the best tool for this particular scenario. The R language operates more quickly in all methods compared to Python since vectorized R code runs at 40 times the speed of vectorized Python (0.000024s vs 0.001s). R stands out in implementation because its native vectorization features along with in-built statistical functions simplify the execution of mathematical operations. The combination of fast runtimes and simple mathematical operation implementation through R makes it my first choice when handling this particular assignment.

**4. Identify and describe one or two other considerations, in addition to these two, in determining which of the two environments – Python or R – is preferable to you.**

The two main determining factors for selecting Python or R involve the integration level between application components as well as the visual presentation capabilities of datasets. The extensive capabilities of the Python ecosystem support both basic programming and machine learning as well as service and tool connection which enables end-to-end data science pipeline advancement. Because R provides advanced statistical tools along with specialized plotting software called ggplot2 it outshines in statistical graphic display while Python demonstrates better statistical computation strength. Decision-making regarding distance computation would be impacted based on whether the analysis purpose is general-purpose programming or statistical analysis.