Homework II - Datascience I

Nathan Bunch

Part 1. Use Fermi estimation to get an estimate on how much energy could be saved if everyone brewed their coffee at 175°F instead of boiling. Make a first estimate without looking up any values. Then look up a few to get a better estimate. Finally try to find the data as directly as you can. Document all your steps.

So, lets begin with the boiling point of water. The boiling point of water is about 212 degrees F. If we take the 212 degrees F minus the 175 degrees and then divide that number by 212 degrees, we result in a percentage of 1 (1 being a hundred, to make it easier to visualize we will take that number and times it by 100). The logic is as follows:

((212 - 175) / 212) * 100 = 17.45%

According to this, we would be saving 17.45% energy if we brewed our coffee to 175 degrees rather than 212 degrees F.

Let now get more precise answers.

1 cup of water = 250 ml = 250 g
175 degrees F = 79.4 degrees C
212 degrees F = 100 degrees C
1 calorie = 4 joules

70 degrees F = 21 degrees C typical room temperature

To raise 1 g of water 1 degree C requires 1 calorie of energy.

Therefore, by using nearly the same mathematics as before, we can conclude the following about saving energy:

((100 - 79.4) / 100) *100 = 20.6% less energy used.

A typical coffee cup is: 350 ml. So, that would be:

((350 - 250) / 350) *100 = 28.6% larger than 250ml, therefore, 250g(0.286) + 250g = 321.5g of water in a typical cup of coffee.

Lets now calculate the amount of energy required to heat the coffee.

Because the room temperature of a room is usually 21 degrees C, the water (we will assume) has been sitting in the Keurig for awhile and is raised to that temperature. To raise the water to boiling at that temperature would require:

100 - 21 = 79 C

To raise that coffee 79 C would require 79 calories or 79*4 = 316 joules of energy.

To raise the coffee to “just hot enough (79.4 C)” would be:

79.4 - 21 = 58.4 C

To raise the coffee 58.4 C, it would require 58.4 calories or 58.4*4 = 233.6 joules of energy.

When searching for direct measurement data or other relevant data, I could not find anything useful, other than accurate energy measurements for heating water.

Part 2. On September 20 we explored the work of Sarah Parcak with two videos, one on The Late Show with Stephen Colbert and the other her TED prize talk. Write several paragraphs exploring issues raised by her work. Engage in this writing the tension between a goal of helping people via revealing history and helping people with immediate needs. Are their broader lessons about technology to be learned in this example? What opportunities are enabled by data science? What responsibility does the data scientist have given the powerful information they can uncover?

The method and technology surrounding Parcak's work in archeology is fascinating. I find that there would be a lot of usage out of the technology for both good and bad purposes. As a programmer, I am naturally curious as to how the technology works on the software side. Anyway, there are two main good uses for the technology and one major bad use for the technology.

The first good use for the technology is the original purpose for the technology, viewing the historical record of the Earth. This historical record enables us as humans to be able to see into our past so that we can learn more about the Earth, as well as learn about the mistakes humans have made before. This observation, enables us to make better decisions and even more knowledge so that we don't continue making those mistakes.

The second good use for the technology is an extensive search and rescue network. Because the satellites that Percak has take really high-quality photos, we could use the photos generated by the system to search for people who are missing. This is probably a very touchy use for the system, as it invades on people's privacy. This idea of privacy infringement is my third and a bad reason for the use of the satellite system.

As stated before, a bad reason for using Parcak's satellite system is for privacy infringement. The entirety of the system is practically a huge surveillance system aimed at the Earth with the potential for tracking and monitoring anyone or anything. I wouldn't be surprised if some of the governments of the world actually use the system for surveillance of their own respective countries or possible other countries as well. This invasion of human privacy (for which we all deserve) is something that needs to be watched over and controlled.

In conclusion to this small paper on the subject, I believe that this formation of technology with so much potential power ought to be controlled and managed through policies that benefit mankind as a whole. By observing this technology, it can be observed that the rise in the development of advancing technology had run virtually unsupervised and without governance. The development and deployment of these technologies ought to be limited a short amount because of the often infringement of human rights.

Another concern is not only the use of the technology itself, but also the management and use of the data generated by the technology. This enormous amount of data can be used by data scientists to make observations concerning the Earth, on the other hand it can also be used to observer and control people. This data, and the use of data, should be just as strictly monitored as the development, deployment, and use of the technology to generate the data.

This observation that I had thought about and had placed here in this essay had been quite interesting, since I have not considered the policy surrounding the development of technology before. Originally I had always thought the continual development of technology was a good occurrence. I suppose that with all such occurrences, too much of it is not good. I still believe that technology ought to be continually developed, however, we definitely need to put some policy as to how the development of technology should be managed.