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| **Take-home assignment (Individual): Reflect on your model (due beginning of class 10/02)** | | | |
| **What approaches did other students take with respect to the data that they used (justifications, assumptions, and limitations) and the way they programmed their model? Be as detailed as possible in listing various differences between models. For each difference talk about WHY you think the other group chose to do it the way they did. Be detailed.** | | | |
| Used protein/carbohydrate/fat/fiber/water composition data from a paper   * They did this because the paper was provided by professor to give an estimate of the food composition. * Additionally, it would allow for them to use the Choi-Okos equations to determine the heat transfer properties of the food.   Using the Choi-Okos results at one temperature point   * This was done to determine the heat transfer properties for the food. * Only one temperature point was done to make the code run more quickly. * Additionally, some found that iterating the Choi-Okos equation at each temperature didn’t change the value very much. * Some did the Choi-Okos at the filling temperature only while others found the average temperature the center of the food was at during the heating process and used that temperature as it would be more accurate throughout the entire time.   Delta t values 25 seconds   * The largest example I came across of a delta t value was 25 seconds. This was calculated from the M equation. * This allowed the M value and the delta x value to be what the coder desired   Using D250 at every temperature   * Some coders used the same death time value, the D250 value given, at each temperature * This ensured that the code ran more quickly and they found that as the D250 value was already very small, changing it for each temperature didn’t change the death time value very much.   7 layers   * The least number of layers I came across was 7. * This value was used to allow the code to run quickly. * The value was chosen so that they could run a for loop rather than a while loop and know how many iterations should be done for distance and time. * They used this value to calculate the delta t. | | | |
| **How did these differ from your own approach? When would your own approach make the most sense? When would different assumptions that other groups made make the most sense?** | | | |
| Differences I saw:   * Used protein/carbohydrate/fat/fiber/water   composition data from a paper   * + I found the data from the USDA database * Using the Choi-Okos results at one temperature point * Delta t values 25 seconds * Using D250 at every temperature * 7 layers | What approach makes the most sense:   * I believe the USDA database made the most sense * I believe that performing one Choi-Okos analysis is more reasonable * I believe that a smaller delta t value makes more sense * I believe that iterating to find the death constant value for every temperature makes the most sense * I believe having more layers makes more sense. | | Why the approach makes the most sense:   * I believe using the USDA database is more reasonable as the values given are specific to the food you want to find information for. Others who used the paper had to adjust the values in the paper to ensure that the moisture content of the foods given in the paper matched the moisture content given in the problem statement. * This is because the heat transfer properties of food change minutely      * This is because the smaller delta t would allow the model to detect more minute changes in the food properties and make modeling the microorganism and vitamin contents more accurate * This is because at cooler temperatures the death time is larger. Thus as the temperature changes, the death constant changes which affects the microorganism and vitamin contents * This makes more sense because a smaller number of layers means a larger change in volume between layers. This means that the model would be less likely to detect minute changes in temperature between the layers. |
| **If you were to do this assignment again what are different assumptions you would make and what do you believe to be the optimal solution to the problem?** | | | |
| Things I would do differently:   * I would not iterate the Choi-Okos equation every time | | Why I would do them differently:   * It would make my code run more quickly while not changing my solution very much | |
| **What was the most challenging piece of this assignment?** | | | |
| The most challenging part of the assignment was deriving the equations from the book to be most applicable to the problem. Additionally, the equations had lots of parentheses, so if any of those were messed up, the entire solution became unstable and it was difficult to determine where the problem was coming form.  I also struggled to determine if sterilization was determined by when the center of the can reached the temperature of the steam or if I needed to first use the sterilization equations from the book and iterate over those. | | | |
| **Why do you feel that was the most challenging?** | | | |
| This was the most challenging because the equations led me to believe that I had come up with the correct solution, but my results showed that the temperature of the outside reached thousands and thousands of degrees Celsius without changing the temperature of the center of the can.  The order of operations was challenging as the checkpoint led me to believe that it was most important to determine when the center of the can reached the steam temperature but my model never allowed it to reach the exact temperature of the steam, even after letting it run iterations over “7 days” worth of time (sitting for 20 minutes and still not reaching a solution). | | | |
| **How did you overcome this challenge?** | | | |
| I overcame this challenge by using my notes from class and separating the equations into functions and then into smaller parts to determine which section of the equation was causing the problem and then analyzing the parentheses within that section.  I overcame the order of operations challenge by discussing solutions with my group and writing out a flow chart on the whiteboard in my room to help myself wrap my head around what was the most important part of the operation. | | | |