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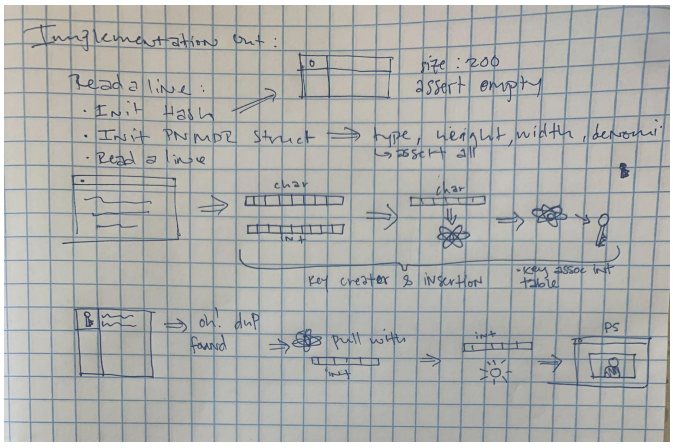
Design Plan: FilesofPix

Restoration Architecture

Readaline
Implement a readaline function that reads a line from the input file, taking into account the provided notes about a single '\n' character at the end of each row. The data is read into a char array line by line.

Restoration plan:
Separate each character in the line into infusion string or numeric sequence which, after processing will be added to the hash

1. Create a struct of Infusion with string *seq which will be an atom, and int numseq. The char *string seq array will hold all non-digit ASCII characters in a line, and the int numseq array will contain the numseq. The atom will work as the key for the hash and the values are inserted into a Hash Table. This way, all lines with the same seq (original to the image) will get recorded with their associated numseq. This will improve time complexity.
2. With a list of Infusion, we will identify the sequence that has multiple matches and use the associated numseq to identify original lines.
3. Construct the final image raster which will be a List* to the List of all matching nums list in the RawNum objects. Create a struct to represent the final PGM image (with int magic number (P2), int row, int col, int max val, List * image raster). Use the final image raster to compute the row, col, maxVal and construct the final pgm object in file for output.



Flow of code Picture:
Atom→ atom data structure
Key→ key from hash function
Sun→ brightness
Picture→ final file

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Implementation Plan

Main – Read file with arguments and call readaline function (1 hours)

Given a file name, open the file and confirm it is valid, call readline and separate line

Initialisation: (4 hours)

readaline Function – reads raw corrupted data line by line into char array

size_t readaline(FILE fd, **datapp)

Use readaline to get contents of a line + size of that line in the file

- Create a char *line_being_read and save the pointer as char* start = line_being_read;
- append the contents of a line into line_being_read and expand the size with realloc
- loop: use getc to read char by char (make sure not eof) - read up to '\n', increment size_of_line for each char
- set *datapp to start pointer of line_being_read or to NULL if eof or size_of_line == 0

a. char *line = *datapp --> line

b. size_t size_of_line = readaline(FILE fd, **datapp) --> size_of_line

In read line also need to keep track of the og dimensions and the brightness #

- Struct to keep track of og dimensions and other info

  Struct PNDMR:
  - Create a struct to represent the final PGM image (with int magic number (P2), int row, int col, int max val, List * image raster). Use the final image raster to compute the row, col, maxVal and construct the final pgm object in file for output.

    Int
  - Test case: assert og dimensions and restored dimensions

Build out a Table with hash capabilities prior to everything

- Init the table should have a limit of rehash: 200 chars
- Run initialisation test cases here (e.g. assert is empty)

Restoration: (10 hours)

- After reading in a line, we call a function to separate line and isolate infusions and raw numbers
  - isolation(string)
    - This function gets sent a string from the file as is
    - We are going to use a while loop that will go through the line and when it reaches a number, it sends it to a type cast that converts the char to an int
      - Store casted char→int to an array

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        - The other chars are to be kept in the char array and eventually sent to the hash function
- Storing things in the table
    - Hash function(string)
        - Need to have the key corresponding to a list of int which correspond with brightness values or int in the string
        - Creates said key and stores the ints associated with it
    - When a key is create more than once → duplicate
        - Will cease to store things in the table and return the first number stored in the map
        - From this moment on the table will only call isolation and qsort to create hash-keys from the created atoms and to find the integers
- Building out the P5 file
    - Need to calculate the brightness for each integer→ brightness funct
        - From the isolation function we get each char (num)
        - We need to then convert it to an int
        - Then calculate the brightness using the saved int in the pnmdr struct
    - Emplace the map read in the the PNMDR struct
        - Use PNMDR write to create final output file
            - Feed data from uncorrupted file
    - Change the type

Output – outputFinalPgm(ImageRaster *imageRaster) to read into another file (2 hours)
Test cases – brainstorm and test various edge cases (4 hours)
Compile - make sure all files compile and run as we progress(2 hours)

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Test Cases Design Plan

As we implement each function we test edge cases as well as valgrind before implementing new ones.

*Use Assert
Test file for everything

1. Readaline Test Case:
    - Read more than one file
    - Read incorrect file name
    - Empty File
    - Regular File
    - File of Newline Character
    - File with 2 or less lines
    - File with more than 200 lines
    - Line with more than 500 characters
    - Line with more than 1000 characters
2. String Manipulation Test Case(s):
    - Regular Line
    - Non-alpha-numeric Character Infusions
    - Case-sensitive Character Infusions
3. HashTable Test Case(s):
    - Hash Function Correctness
        - Check if function is developing correct keys for each atom
    - No/Empty numeric sequence
    - No infusion sequence (all unique)
    - Memory Allocation (make sure memory being allocated)
        - List every time we malloc anything so we can keep track and free memory e.g. struct, table, pointers
        - Free up memory when table hashed
        - Free up memory when done with readaline and there's extra space
4. Other Test Case(s):
    - Successfully closing program after doing the restoration
    - The named input file cannot be opened
    - An error is encountered reading from an input file
    - Input is expected but not supplied
    - Memory cannot be allocated using malloc