HW1 – Rank Aggregation

For this assignment our goal was to make a rank system, we specifically focused on voting and ballots. Some examples of the system.

```
% ./vote bestpicture2021.conf bestpicture2021.ballots799
Candidate                      Score
----------------------         -----
Nomadland                      1992.
TheFather                      1995.
PromisingYoungWoman            2055.
JudasandtheBlackMessiah        2059.
Chicago7                       2071.
Minari                         2164.
SoundofMetal                   2190.
Mank                           2253.
```

In this assignment we focused on 4 OCaml files that handled the voting and ranking system. Yet the majority of the work went into the rank.ml file that handles creating, a data base type, computing an update scores in the database, computing the scores of single candidates, and then scoring all the candidates.

HW2 – Recommendation System

This hw was all about developing a recommendation system algorithm. From our instructions, “The basic idea behind recommender systems is that a collection of users each contribute some sort of rating (e.g., "like"/"don't like", "upvote"/"downvote", "10 out of 10"...) on some items from a collection. Then using these ratings the system tries to either find users who have similar ratings on many items (user/user similarity) or items that have similar ratings from many users (item/item similarity). In the second case, the idea is that if many users had a similar opinion of both items, then they must have something in common.” (hw2.md) We'll build an application that uses item/item similarity to find other items similar to a given item.

A example of the program would look like:

```
% ./rec
Enter name of ratings file: music.csv
Enter name of item to search for: prince
How many suggestions do you want? (1-5): 5

#       score   name: description
==      ======  ==================
1)       0.667  dylan: Bob Dylan
2)       0.470  lizzo: Lizzo
3)       0.255  hippocampus: Hippo Campus
4)       0.136  suburbs: The Suburbs
5)       0.130  replacements: The Replacements
Make another recommendation? (y/n): y
Enter name of item to search for: turtles
How many suggestions do you want? (1-5): 5

#       score   name: description
==      ======  ==================
1)       0.737  soulasylum: Soul Asylum
2)       0.657  arcwelder: Arcwelder
3)       0.622  atb: After the Burial
4)       0.607  cadillac: Cadillac Blindside
5)       0.578  motioncity: Motion City Soundtrack
Make another recommendation? (y/n): n
```

```
% ./rec
Enter name of ratings file: coffee.csv
Enter name of item to search for: frenchmeadow
How many suggestions do you want? (1-5): 5

#       score   name: description
==      ======  ==================
1)       0.425  einstein:  [Einstein Bros]
2)       0.354  fultonst:  [Fulton Street Cafe]
3)       0.318  btown:  [Bordertown Coffee]
4)       0.312  7corners:  [7 corners coffee]
5)       0.269  brueggers:  [Bruegger's]
Make another recommendation? (y/n): y
Enter name of item to search for: mitea
How many suggestions do you want? (1-5): 5

#       score   name: description
==      ======  ==================
1)       0.588  btown:  [Bordertown Coffee]
2)       0.556  sugartiger:  [SUGAR TIGER]
3)       0.545  mumu:  [Mu Mu Tea]
4)       0.443  wbcaribou:  [West bank caribou]
5)       0.417  hub:  [The HUB Caribou]
Make another recommendation? (y/n): n
```

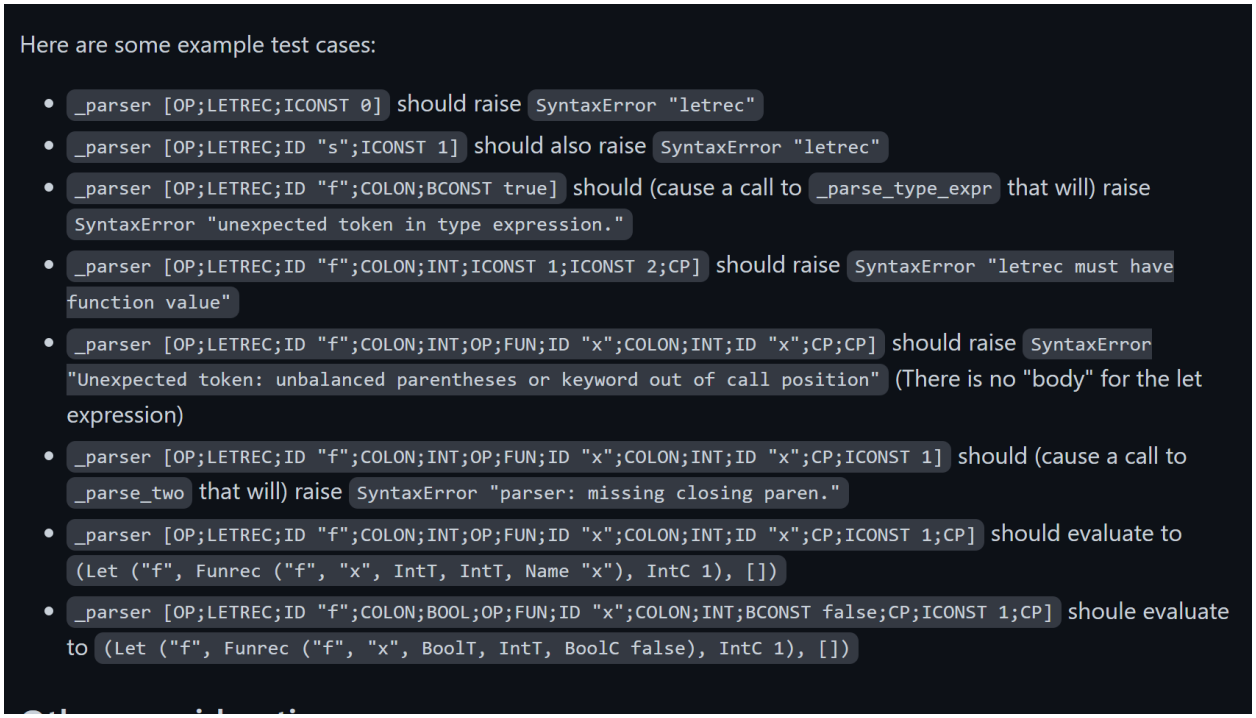
When developing this rating system we had 4 main components to focus on

1) A data basethat would relatin all the information from the csv files
2) A from_file function, this was the hardest part of the project as we had to make sure that all the files were in a correct format while also throwing errors if there was a mistake
3) From there we add, what I would describe as class files, they were build to grab certain data from the database such as names, handles, items and descriptions.
4) Then from there we work on similarity functions that would handle the mathematical computation of rating and recommending

HW3 – Advanced Program Manipulation

This homework assignment focused on making parser and S-Expressions, the idea was to run an interpreter tha inputs a source file and creates a progString, this progString will then be passed into a function called wordlist in parser.ml, “which converts the string into a list of all the substrings separated by "word boundaries" like white space and parentheses, and this list is given as input to the function tokens,” (hw3.md)

Code examples:



HW4 – Grepping Conclusion

In this assignment we made are own grep program. Grep is a useful terminal program that reads in a file and prints any expressions of requested string. Grep is normally used in a linux terminal, explained as “grep searches for PATTERNS in each FILE. PATTERNS is one or more patterns separated by newline characters, and grep prints each line that matches a pattern. Typically PATTERNS should be quoted when grep is used in a shell command. A FILE of “-” stands for standard input. If no FILE is given, recursive searches examine the working directory, and nonrecursive searches read standard input.“

Our goal for this assignment was to develop something similar in OCaml.

Some example of the code:

```
% ./camlgrep -v "[Uu]niversity\|Gopher\|Minnesota" umnwiki.txt
Heights, a suburb of St. Paul, approximately 3 miles (4.8 km) apart.[10] The
system and has the ninth-largest main campus student body in the United States,
with 51,327 students in 2019–20.[11] It is the flagship institution of the
other major academic units.

Universities and is ranked 17th in research activity, with $954 million in
research and development expenditures in the fiscal year 2018.[13] In 2001, the
includes publicly funded universities thought to provide a quality of education
comparable to that of the Ivy League.[14]

counts 25 Rhodes Scholars,[17] seven Marshall Scholars,[18] 20 Truman
Guggenheim Fellowship, Carnegie Fellowship, and MacArthur Fellowship holders, as
well as past and present graduates and faculty belonging to the American Academy
of Arts and Sciences, National Academy of Sciences, National Academy of
Humphrey and Walter Mondale, and Bob Dylan, who received the 2016 Nobel Prize in
Literature.[22]

Division I Big Ten Conference and have won 29 national championships.[23] As of
medals.[24]
```

```
% ./camlgrep -n "\d\d" umnwiki.txt
4:Heights, a suburb of St. Paul, approximately 3 miles (4.8 km) apart.[10] The
7:with 51,327 students in 2019–20.[11] It is the flagship institution of the
8:University of Minnesota System, and is organized into 19 colleges, schools, and
12:territorial university in 1851, seven years before Minnesota became a state.
14:research activity.[12] Minnesota is a member of the Association of American
15:Universities and is ranked 17th in research activity, with $954 million in
16:research and development expenditures in the fiscal year 2018.[13] In 2001, the
19:comparable to that of the Ivy League.[14]
21:University of Minnesota faculty, alumni, and researchers have won 26 Nobel
22:Prizes[15] and three Pulitzer Prizes.[16] Among its alumni, the university
23:counts 25 Rhodes Scholars,[17] seven Marshall Scholars,[18] 20 Truman
24:Scholars,[19] and 127 Fulbright recipients.[20] The university also has
28:Medicine, and National Academy of Engineering.[21] Notable University of
30:Humphrey and Walter Mondale, and Bob Dylan, who received the 2016 Nobel Prize in
31:Literature.[22]
33:The Minnesota Golden Gophers compete in 21 intercollegiate sports in the NCAA
34:Division I Big Ten Conference and have won 29 national championships.[23] As of
35:2021, Minnesotas current and former students have won a total of 76 Olympic
36:medals.[24]
```