



NEW YORK INSTITUTE  
OF TECHNOLOGY

# CSCI 455 - M01/ Spring 2021 Senior Design Project



Team: Scholar Werks

Advisor: **Dr. Wenjia Li**

Team Member:

Hui Chen, Gregory Salvesen, **Michael Trzaskoma**, Jungi Park, Zakaria Khan

## ***What is Scholar Seek?***

- Cross-platform mobile application
- One stop shop for quickly discovering scholarships, majors, and colleges
- Primarily intended for high school students interested in higher education in the United States, can also be used by undergraduate students

## *Why Scholar Seek?*

- As students we relate to the struggle of pursuing a higher education
- Selecting the right college, choosing the right area of study, and financing the whole endeavor is a difficult process
- Important life altering decision
- Students may not even know what information is important regarding how they should make their decision

# *ScholarSeek's Mission*

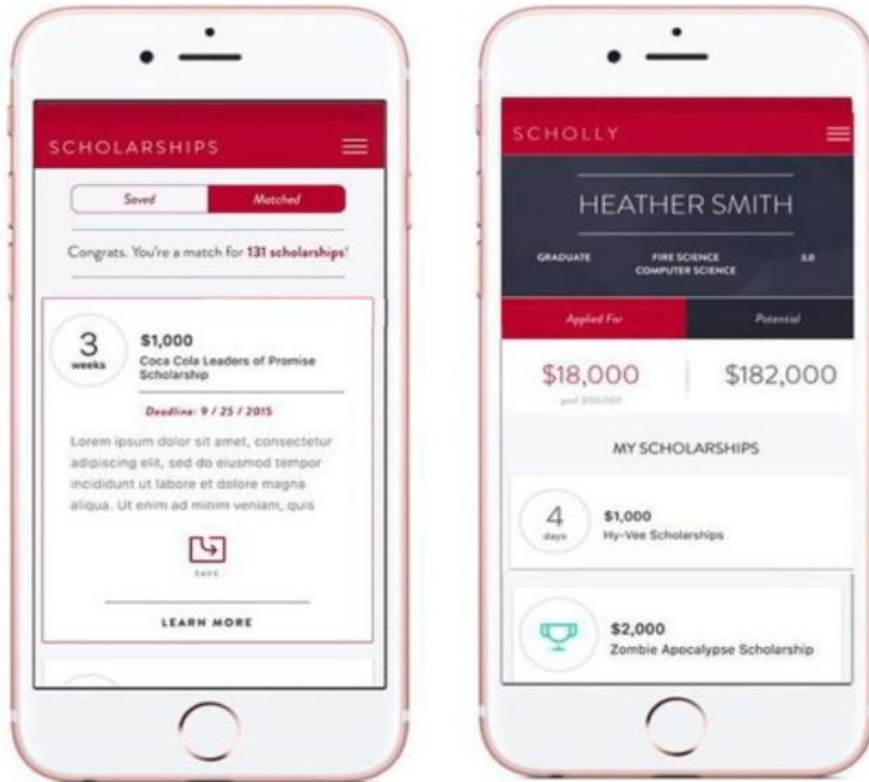
Help Students:

- Find scholarships
- Find their college
- Find their majors
- Empower students to use only the features they need
- No excessive personally identifying information required

## *ScholarSeek Feature Set*

- Scholarships: relevant category & custom recommendation
- Colleges: relevant category & custom recommendation
- Majors: relevant category & custom recommendation
- Bookmark scholarships, colleges, and majors for viewing
- History: view scholarships, colleges, and majors that have been browsed

# Related Works/Existing Apps (1)



## Scholly

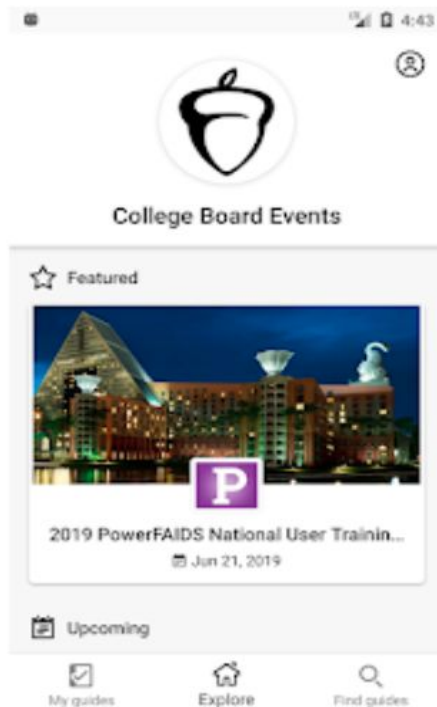
### Pro

- Good User Interface (UI/UX)
- Android & IOS
- Easy Navigation

### Con

- High Month Paywall
- Financially burden for college student

## Related Works/Existing Apps (2)



### College Board


### Pro

- Web & Mobile
- Various Feature

### Con

- Asking Personal Information
- Data Monetization

# Related Works/Existing Apps (3)



**Scholarships.com**  
You Find Money. Colleges Find You.

Scholarship Search

My Profile

College Search

Blog

About Us

Trending Now Colleges

**Texas A & M University-College Station**  
Academic Level : Public, 4-year or above  
City, State: College Station, TX  
School Size: 61642  
Tuition (in-state) : \$9,685.00  
Tuition (out-of-state) : \$26,583.00

**Stanford University**  
Academic Level : Private not-for-profit, 4-year or above  
City, State: Stanford, CA  
School Size: 16963  
Tuition (in-state) : \$45,195.00  
Tuition (out-of-state) : \$45,195.00

**University of California-Los Angeles**  
Academic Level : Public, 4-year or above  
City, State: Los Angeles, CA  
School Size: 41845  
Tuition (in-state) : \$12,705.00  
Tuition (out-of-state) : \$35,583.00

**The University of Texas at Austin**  
Academic Level : Public, 4-year or above  
City, State: Austin, TX  
School Size: 51313  
Tuition (in-state) : \$9,830.00  
Tuition (out-of-state) : \$34,836.00

**New York University**  
Academic Level : Private not-for-profit, 4-year or above  
City, State: New York, NY  
School Size: 49274  
Tuition (in-state) : \$46,170.00  
Tuition (out-of-state) : \$46,170.00

**Arizona State University**  
Academic Level : Public, 4-year or above  
City, State: Tempe, AZ

## Scholarship.com

### Pro

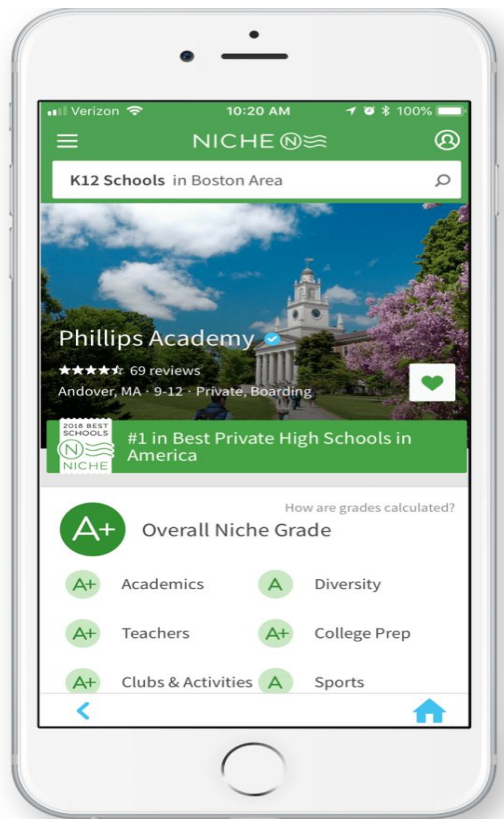
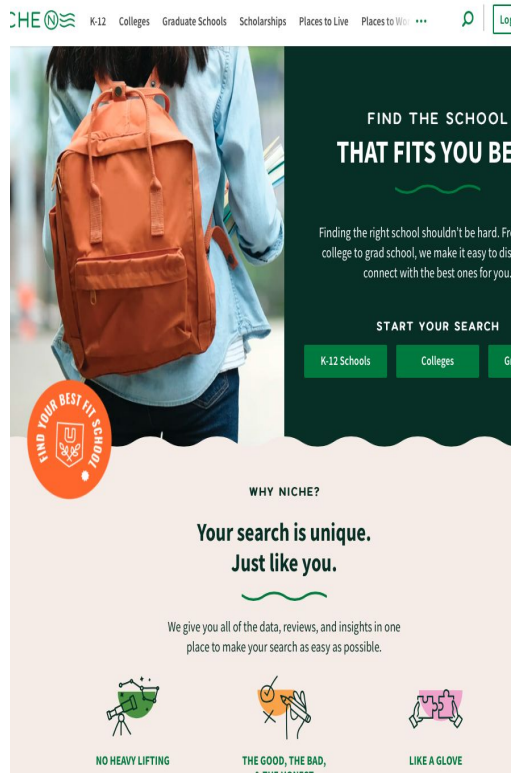
- Web & Mobile
- College and Scholarship Search

### Con

- Requiring Personal Information



# Related Works/Existing Apps (4)



Niche

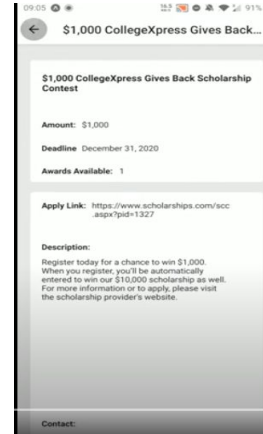
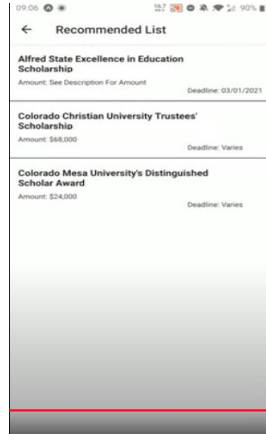
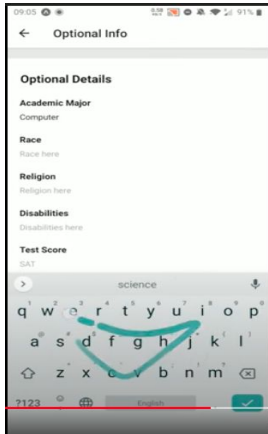
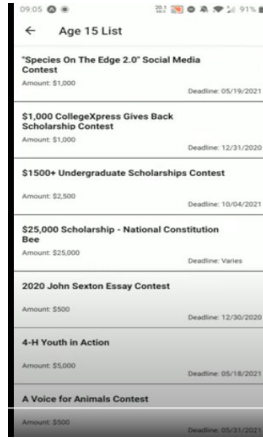
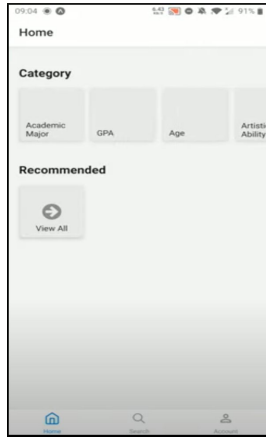
Pro

- Web/Mobile
- Liable college data

Con

- Some of the college data is biased

# Pre-Existing Apps (CSC1 426 - Information Retrieval)



## Scholarship Recommendation

### Pro

- Easy User Interface (UI/UX)
- Scholarship Recommendation

### Con

- No authentication
- Simple UI/UX
- Not User-friendly Survey

# Continuation of Existing Project

	Enhanced UI/UX	Encrypted Authentication System	Scholarship Recommend Feature	Enhanced Scholarship Recommend Feature	College and Major Recommend Feature	Browsing History and Bookmarks Feature	Modify Existing Survey Data	Sorting Categorized Browsing	MongoDB
CSCI 426 Scholarship Recommendation									
Scholar Seek									

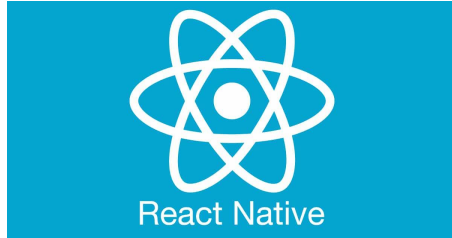
# *Software Engineering Model*

## Waterfall Approach

- Limited Timeline
- Linear Development Objectives
- Team Collaboration across features
- Fixed Target Audience/Client with fixed needs
- Natural linear continuation of an existing project

# *Implementation and Tools and Technologies Used*

Front-end:



React Native



Javascript

Cloud:



Amazon  
**EC2**

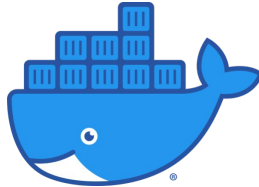
Back-end:



MongoDB



Python



Docker



Git



Flask

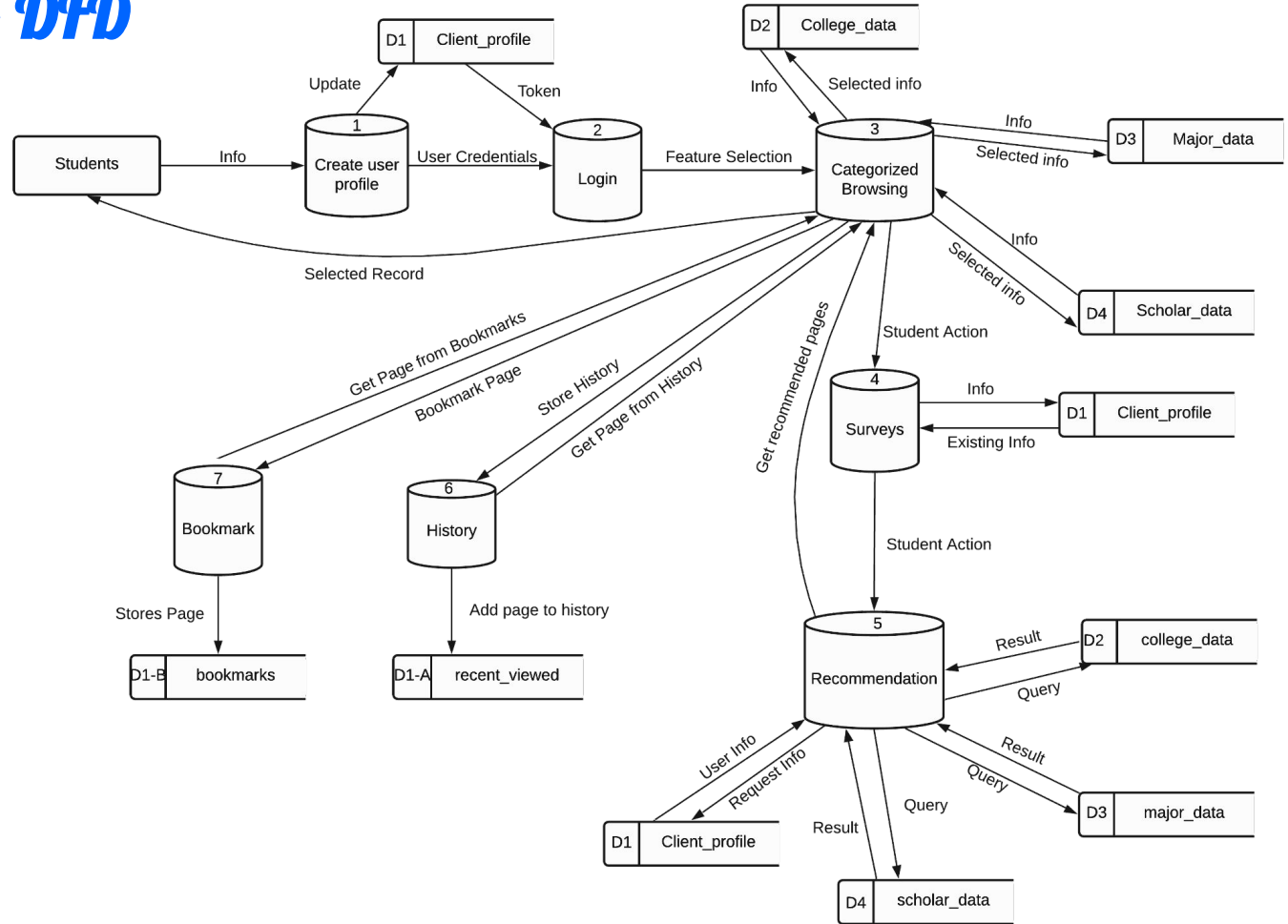


Selenium



JWT

# Overall Design - DFD



# Overall Design: DB - Structure

## Scholarships

- `_id:objId`
- `name:str`
- `amount:str`
- `deadline:str`
- `awards available:str`
- `direct Link:str`
- `description:str`
- `contact Info:str`
- `binary:str`
- `terms:Array`

## Colleges

- `_id:objId`
- `grad:0`
- `name:str`
- `niche_grade:Object`
- `description:str`
- `site:str`
- `address:str`
- `location_tags:Array`
- `about:Array`
- `athletics:Object`
- `ranking:Object`
- `admission:Object`
  - `sat:Object`
    - `accept_score_range:str`
    - `reading_score:str`
    - `math_score:str`
    - `submite_by_student:str`
    - `minSat:int`
  - `act:Object`
    - `accept_score_range:str`
    - `eng_score:str`
    - `math_score:str`
    - `write_score:str`
    - `submite_by_student:str`
    - `minAct:int`

- `cost:Object`
  - `net_cost:str`
  - `financial_aid_url:str`
  - `loan:Object`
  - `net_price:Object`
  - `tuition:Object`
    - `in_state:str`
    - `out_state:str`
    - `avg_housing:str`
    - `avg_meal_plan:str`
    - `book:str`
    - `plan:Object`
- `academic:Object`
  - `graduation_rate:str`
  - `class_size_ratio:Object`
  - `popular_major:Object`
  - `faculty:Object`
- `major:Object`
  - `gender_ratio:Object`
  - `residence:Object`
  - `age:Object`
  - `racial_diversity:Object`
- `campus_life:Object`
  - `sport:Object`
  - `club:Object`
- `after_uni:Object`
  - `graduation_rate:str`
  - `earning:Object`
  - `employment:Object`
  - `debt_after_uni:str`
- `binary:Array`

## Majors

- `_id:objId`
- `major:str`
- `avg_salary:str`
- `unemp_rate:str`
- `autom:str`
- `subjects:Array`
- `var_jobs:str`
- `social:str`
- `env:str`
- `classes:Array`
- `jobs:Array`
- `desc:str`
- `binary:Array`
- `category:str`

# Overall Design: DB - Cont.

## Client Profile:

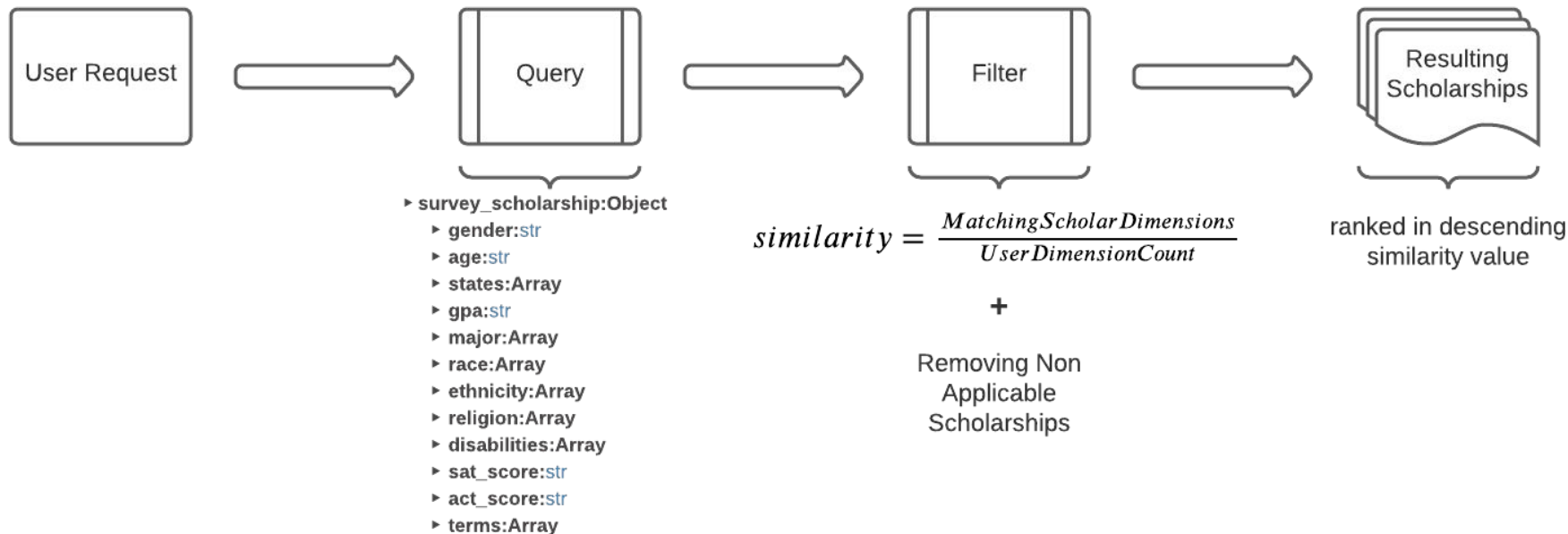
- `_id:objectId`
- `paswrd:str`
- `active:int`
- `activationCode:str`
- `activationDate:UTC Date Time`
- `devices:Array`
  - `0:Object`
    - `Jwt:str`
    - `Unique_id:str`
    - `token:str`
    - `expireDate:Date`
- `survey_scholarship:Object`
  - `gender:str`
  - `age:str`
  - `states:Array`
  - `gpa:str`
  - `major:Array`
  - `race:Array`
  - `ethnicity:Array`
  - `religion:Array`
  - `disabilities:Array`
  - `sat_score:str`
  - `act_score:str`
  - `terms:Array`
  - `binary:str`
- `survey_college:Object`
  - `regions:Array`
  - `majors:Array`
  - `sat:str`
  - `act:str`
- `survey_major:Object`
  - `income:str`
  - `unemp:str`
  - `autom:str`
  - `varJobs:str`
  - `social:str`
  - `workEnv:str`
  - `binary:Array`



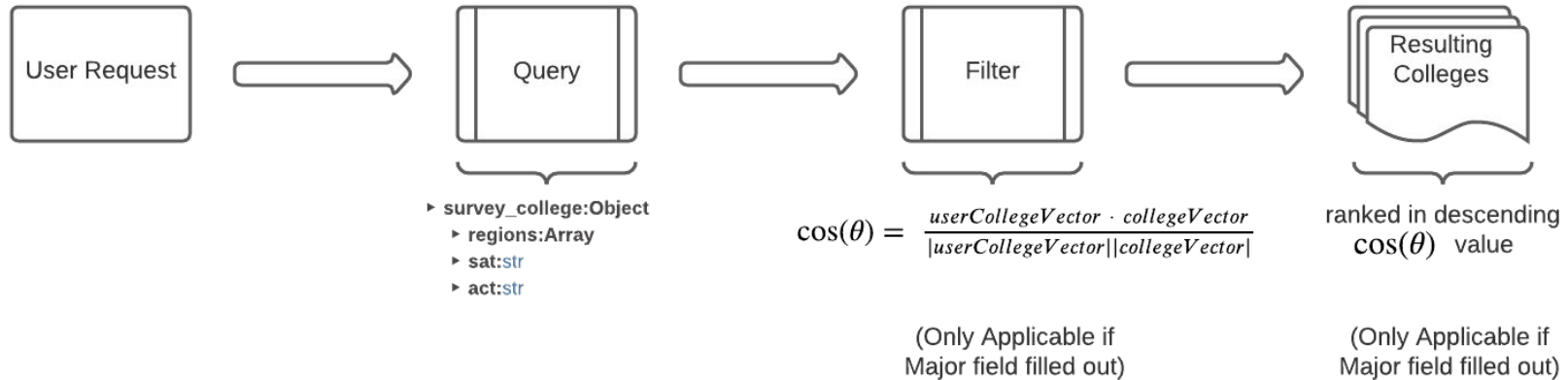
# Datasets:

- Scholarship data
  - Scraped from [scholarships.com](https://scholarships.com)
  - Scale: 3,798 documents, 7 attributes, and 8.3 MB size
  - Zero missing data
- College data
  - Scraped from [niche.com](https://niche.com) college ranking list
  - Scale: 2,782 documents, 200 ± attributes, and 13.5 MB size
  - Missing SAT and ACT attributes (some colleges)
- Major data
  - Combination from [scholarships.com](https://scholarships.com), [niche.com](https://niche.com), and Academic Researches
  - Scale: 45 documents, 12 attributes, and 42.7 KB
  - Zero missing data

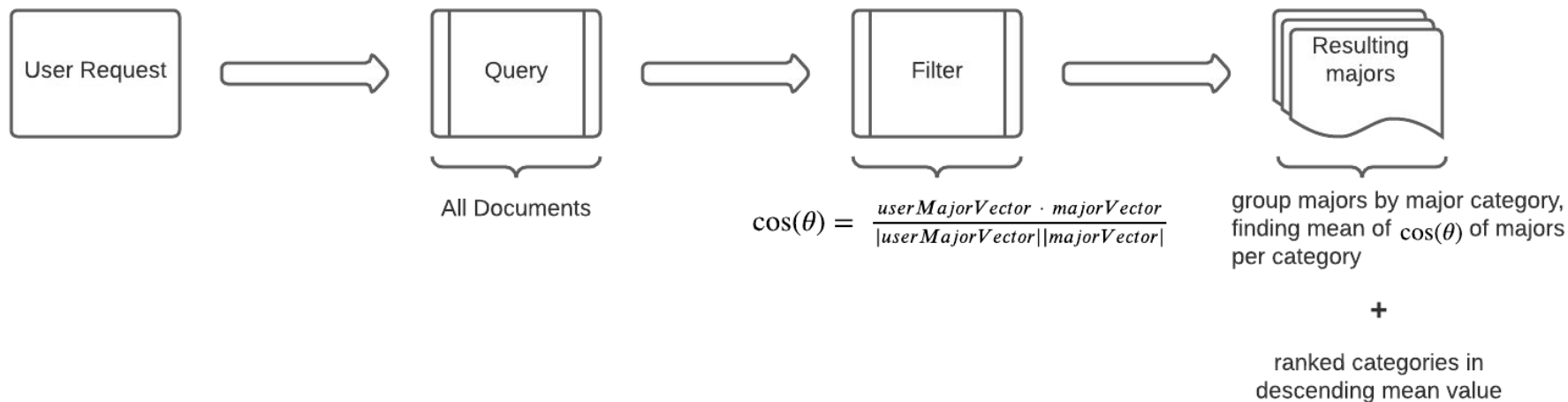
# Recommendation Model - Scholarships



# Recommendation Model - Colleges



# Recommendation Model - Majors



# Testing

## Scholarship Algorithm :

	Browse By State	3 User Dimensions (No state)	4 User Dimensions	6 User Dimensions	10 User Dimensions	21 User Dimensions
Precision	0.1	0	0.5	0.5	0.7	0.9
Mean Avg Precision	1	0	0.419	0.745	0.776	0.989
Records Returned (Max 10)	10	10	10	10	10	10

## College Algorithm:

	Browse By State	State/Sat & Act	State/Major	Sat & Act /Major	State/Sat & Act/ Major
Precision	0	1	0.6	1	1
Mean Avg Precision	0	1	0.68	1	1
Records Returned (Max 10)	10	10	10	10	3

Major Algorithm: 60% ( $\frac{3}{5}$ ) of users satisfied with results

# Security

## Authentication system

- Salted and Hashed Password using MD5 Algorithm
- Token to identify the user role and identity
  - Encode with Json Web Token (JWT)
    - Header - encoding algorithm (HS256)
    - Payload - user role (device UUID) and a expiration timestamp
    - Signature - base64 encode header and payload through a 256 bit secret key
  - 256 bit secret key decode the JWT
  - 7 days expiration

## *Demo - Scholar Seek*

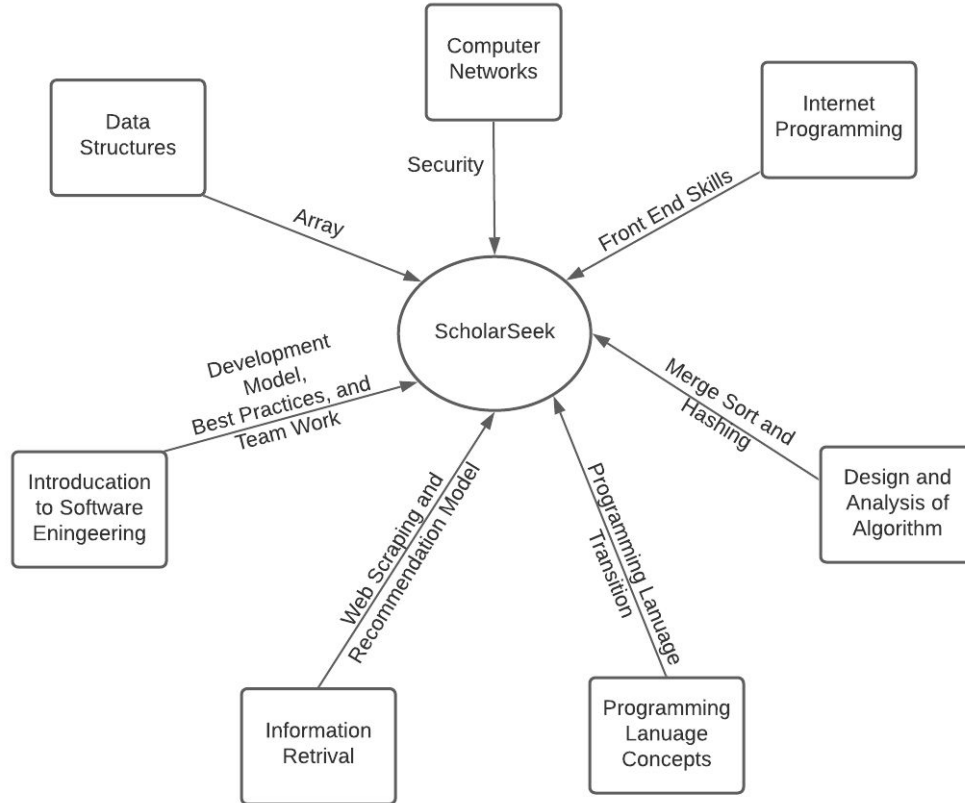
<https://drive.google.com/drive/u/0/folders/1kyDd3teyw0Imrcs-EwCyojZngtWPOueL>

# *Future Works*

- Continuous Integration (CI)
- Security
  - Front End Token Secure Storage
  - Encrypt the database
- User Experience Enhancement
  - Account delete option
  - Tool Tips
  - Accessibility
  - Feedback system
- Supplement College dataset
- Administrator Web Portal



# Previous Course Contributions



# Team Contribution



Hui Chen

API Design, Web  
Scraping, Token,  
UX/UI,  
Deployment



Jungi Park

UX/UI, API Call/  
UI Bug Fix



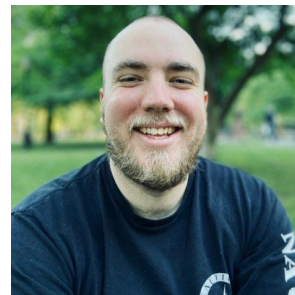
**Michael  
Trzaskoma**

Recommendation  
Model, DB



Zakaria Khan

UX/UI, Surveys,  
Input Handling,  
Bookmarking



Gregory Salvesen

API Design,  
Security,  
Authentication,  
Team Website

# References

1. Existing Project from CSCI 426, <https://github.com/hchen98/csci426-project>
2. Scholly, <https://myscholly.com>
3. Niche, <https://www.niche.com/?ref=colleges>
4. College Board, <https://www.collegeboard.org>
5. Scholarship.com, <https://www.scholarships.com>
6. Structure the backend with Flask,  
<https://pythonise.com/series/learning-flask/your-first-flask-app>
7. MongoDB with Python, <https://pymongo.readthedocs.io/en/stable/>
8. JWT, <https://jwt.io/introduction/>



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Thank you!

Website:

<https://michaeltrzaskoma.github.io/455-ScholarshipRecommendation/>

Code Repository:

<https://github.com/MichaelTrzaskoma/455-ScholarshipRecommendation>