Software Design - CSC 312

Group Project Proposal

SEO Analyzer

Group 4

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1. Introduction

We describe briefly what our project is about through answering the following questions:

• What is the title of your project?

- SEO Analyzer

• What is the goal of the project?

- The primary goal of "SEO Analyzer" is to elevate a website's ranking in Google searches for user-specified keywords. By honing in on search engine rankings, our project aims to refine the scope of SEO efforts to where they can have the most impact. This approach acknowledges that while there are numerous strategies to increase a website's overall traffic, improving its visibility in search results for relevant keywords is essential for attracting quality, targeted traffic. "SEO Analyzer" will leverage optimization strategies tailored to the nuances of Google's search algorithms, focusing on enhancing web content and structure to align with these keywords. Success in achieving this goal will be measurable through Google Search Console, providing clear, quantifiable feedback on the effectiveness of the SEO enhancements implemented. This narrowed focus ensures our efforts are directly contributing to increased visibility and relevance in the digital landscape, aligning with our users' objectives to draw more engaged and interested visitors to their sites.

• What is the motivation for this project?

- The motivation stems from a desire to systematize and automate the process of SEO improvement at no cost. Recognizing the pivotal role of SEO in a company's online visibility and success, our project aims to make this essential service accessible to all, particularly benefiting local, small-scale businesses including startups within the Hurt Hub community and those initiated by students.

• Who are the customers/users?

- The primary customers and users are local, small-scale businesses. Initially, our focus will be on businesses within the Hurt Hub, including student startups, providing them with a valuable tool to enhance their online visibility effectively.

• What development process will you be using?

- Scrum (more details will be discussed later)

2. Novelty

- Two of the comparison products we found are **SemRush** and **Moz Pro**. Both of these two products are renowned for their extensive feature sets, including keyword research, site audits, and competitor analysis. These tools are geared towards SEO professionals and large-scale enterprises, evidenced by their complex user interfaces and substantial pricing models (SemRush at $129.95/month and Moz Pro starting at $99/month). While powerful, their complexity and cost pose challenges for a significant portion of potential users, particularly small businesses and individuals with limited budgets or SEO expertise.

For our product, the main aspects of novelty include:

1. Accessibility and Cost-Effectiveness
    - Unlike the subscription-based models of SemRush and Moz Pro, "SEO Analyzer" is free and open-source. This dramatically lowers the barrier to entry for users who previously could not afford such tools, making advanced SEO analysis accessible to all.
2. Balanced User Experience
    - "SEO Analyzer" aims to find the sweet spot between offering comprehensive functionalities and meeting actual user needs. By conducting user interviews and feedback sessions, the project will identify and focus on features that users find most valuable and frequently use, ensuring a more intuitive and less overwhelming interface.
3. Targeted Functionality for Non-Professionals
    - Tailoring its feature set specifically for non-professional web developers and small businesses, "SEO Analyzer" intends to offer just the right tools and guidance for this audience, avoiding the one-size-fits-all approach of SemRush and Moz Pro.
4. Community-Driven Evolution
    - The open-source nature of "SEO Analyzer" facilitates a community-driven development process, encouraging contributions that align closely with user needs and the latest SEO trends.

3. Customer Need

• Who is the primary customer outside the team?
- Small-scale businesses which are local to the Davidson-Charlotte area, likely startups which work with the Hurt Hub or startups by students (Direct Camp).

• Who are the secondary stakeholders/customers?
- Hurt Hub, as they could benefit from offering our free tool to possible clients
- Customers searching for products related to the website, as they could find their desired products quicker
- College students, as they could possibly increase their profile's ranking in searches on LinkedIn Recruiter for job candidates or increase their personal website's ranking in Google searches (possible side project, if time allows)

• **What do the stakeholders want? Why?**
- They want a better SEO ranking and higher website exposure and accessibility to their targeted audience. This can increase their brand exposure and reach a wider, desired audience base.

• What is their desired overall experience?
- They want the analysis process to be safe, free, and convenient.
- Reaching out to their target audience more in an organic way.

3.1 User Requirements

Write at least 5 SMART user stories based on the stakeholder's needs and wants:
- As a < role > I want < action > so that < benefit >
- As a business owner, I want to improve my website's SEO so that my brand can have better exposure and reach more targeted customers.
- As a business owner, I want to examine my competitors' SEO strategies so that I can identify opportunities to improve my business quality.
- As a student, I want to improve the visibility of my personal portfolio website so that I have a higher chance of being seen by admission officers or employers.
- As a student, I want feedback on how to increase my LinkedIn profile's ranking on LinkedIn Recruiter so that more recruiters reach out to me for opportunities
- As a customer, I want to accurately find the websites/companies I am looking for so that I can learn about and/or purchase their products/services.
- As a developer for a small business, I want to receive feedback for on-page SEO improvements so that I can optimize the website more efficiently.

3.2 Acceptance Tests

Write at least 5 acceptance tests for the user stories using the template:

- Given < some context > when < triggering event > then < expected outcome >
- Given a new user, when they click the register button, then they will be redirected to input their username, email, and password to register for an account
- Given a registered user with valid credentials, when they enter the correct username and password and click "Log In", then they should be directed to their account dashboard
- Given a business owner with their website URL, when the website URL is put into our software, then the business owner should receive feedback on the SEO ranking and improvement advice
- Given a business owner confused about the algorithm of our software, when they click on About, then they will be redirected to a page explaining the inner workings of our software
- Given a user has implemented previous SEO recommendations provided by the tool, when the website is reevaluated for SEO, then there should be tangible improvement.

4. Project Goals

4.1 Customer Problems and Benefits

• What customer problem have you chosen to address?

- When a startup’s website appears too low in Google searches of the website’s relevant keywords

• In implementation-free terms, what user benefit will the system provide?

- With an SEO analyzer, a startup employee could increase the likelihood of their company’s website being seen in Google searches
- With a free SEO analyzer, a startup can prioritize their budget on other vital resources, such as employees and subscriptions to cloud services.
- With an intuitive SEO analyzer, a startup employee can quickly start optimizing their website’s search engine rankings

• How will the benefit support the customer’s desired overall experience?

- The customer would not need to spend time or resources into thinking much about the SEO aspect of their business and focus more on development. Suggestions to rank their websites as high as possible will be provided.

4.2 Measure of Success

• Who outside the team have you tested the idea on?

- ~~Individuals who have their personal websites, small business from hurthub, or even HurtHub itself as they have their own website~~
- Currently no one

• How will you know whether the customer got their desired benefits?

- By quality attributes, we can ask the customer to complete feedback questionnaires and interviews
- For functional benefits, we can monitor and analyze key performance indicators, such as we can compare the website's Google search ranking before and after they use our SEO

• What are your customer-centric measures of success?

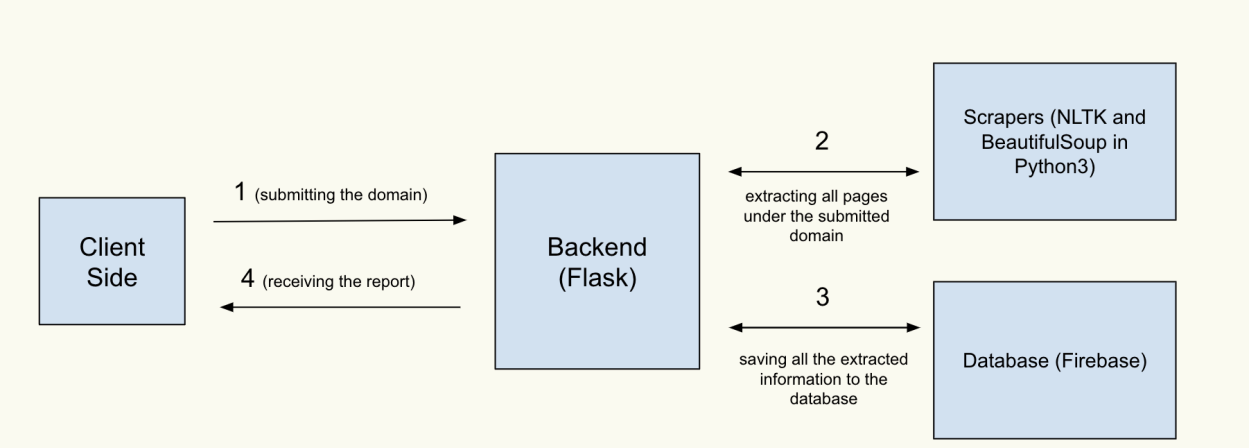
- To measure if our software's SEO advice was effective, we can first use the Google Search Console to determine the customer website's average ranking in Google searches for the customer's desired keywords for some set timeframe before applying the SEO advice. Then, we can use the Google Search Console to determine the customer website's average ranking in Google searches for the customer's desired keywords for some set timeframe after applying the SEO advice (with no other change being done to the website's SEO). If the difference between the second average ranking and the first average ranking is greater than 0, then we would conclude the SEO advice was effective.
- To measure is our software is easy to learn, we can let the customer use SemRush to increase their website's Google search ranking on specific keywords, while also documenting a description of their experience with SemRush. Then, we can let customers do the same with our tool. If the customer's experience descriptions show that our tool was easier to become familiar with, then we would conclude that our tool is easy to learn.

5. System Description

For this proposal, a rough draft of this section is enough.

• Draw a block diagram to show how the proposed system will interact with external services, databases, etc. Clearly mark the boundaries of the

system.



• Use the above diagram to introduce the system.

The provided system diagram will work concurrently with the backend work and the simplistic UI the users will be interacting with. On the backend, we will have database, scraping and validation operations going on.

• What are the main elements of the proposed system?

Main elements:

- Frontend
- Backend
- Scrapers
- Database

6. Solution Approach

For this proposal, a rough draft of this section is enough.

• Briefly describe how the system will work.

- In order to reach the business owners, we want to create an interface where they can enter their website's domain for SEO analysis.
- Later the crawler will start from the index page of this domain, and follow as many links as possible.
- Asynchronously, the crawlers will try to evaluate the use of backlinks, content's appropriateness and other semantic features such as the meta tags.
- As the report is created by these metrics in the backend, they will first be saved to a local database or a cloud hosted database like Firebase.

- Finally, the report will be sent to the UI, so that the business owner can get suggestions for their SEO improvements.

• What technologies (platform, tools, libraries, programming languages) will you use and why?

- To begin with, we are planning to use Python for most of our backend development.
- A framework like Flask can help us build a simple backend
- Python will also allow us to use numerous pattern extraction and parsing tools such as NLTK Toolkit and BeautifulSoup.
- We are planning to use a non-development-heavy database like Firebase or a local SQL.
- The project will be hosted in AWS or Vercel's free hosting along with Davidson's domain

• How will you test and measure the adequacy of your test strategy?

- Firstly, the validity of these tools will be set to be as simple and efficient as possible to comply with our acceptance tests. (This will be measured by time performance and client interviews)
- Secondly, we will be using other tools such as Semrush or manual efforts to see if our SEO advice matches with the provided report.

7. Project Management

• What development process will you use (Scrum, XP, Scrum+XP, etc.)?

- Agile Scrum

• What are the reasons behind your choice?

- Iterative process focusing on adding working modularized features at the end of each sprint. Clear division of roles of developers, scrum master, and product owner to streamline the workflow. Weekly standups to ensure communication. Flexibility and trust for the developers.

• Describe your (brief) goals for each iteration (Proposal-Report 1, Report 1 - Report 2, and Report 2 - Final)

- Proposal-Report 1: Establish the Scrum details. Finish product backlogs. Locate and connect with customers. Start the sprints.

- Report 1-Report 2: A working model from the sprints.
- Report 2 - Final: Application to the customers' websites, gather feedbacks, and finetune the product with final sprints.

8. Team Management

8.1 Roles

• What are the planned roles for the team members?

- Developers: Alp, Donald, Delario, and Sky
- Scrum Master: Donald, Sky, and Delario will alternate for this role
- Product Owner: Alp

• What are the reasons for your decision?

- The project idea originates from Alp and we believe he will be a better communicator with the customers and thus should be the product owner. Having the same product owner also avoids confusion from the discrepancy in information and ensures a consistent communication process. The rest of the developers will alternate for the scrum master to evenly divide up the extra scrum master work over the semester.

8.2 Scheduling

• How often will the team meet?

- Bi-weekly stand-ups

• How will you meet as a team? Zoom? In-person?

- We will be meeting both in-person and via Zoom, depending on the content of our meeting.

8.3 Background

Write brief introductions of each team member related to the experience and background of the project. For example, student A has experience developing Android mobile applications using Java. Simply having an experience in certain programming languages is fine as well. Consider this section an opportunity to determine who can be responsible for what part of the system (e.g., experience in JavaScript can do a front-end development while Java can do a back-end, etc.)

- Sky: Python/Flask, Full stack web app, SQL , web-scraping, & cloud platforms
- Delario: Python, familiar with pytest. Has a strong Mathematics background and experience introducing unfamiliar tools to others. Built full-stack web app with JavaScript and SQL last semester.

- Donald: Python, Java, and C, and has a fairly solid background in machine learning related techniques. Built a web-app with Sky last semester (Python Flask and SQL)
- Alp: Python, JavaScript and Java programming languages. Additionally, Alp has worked with backend frameworks such as Flask, Django and Node.js, server side JavaScript. Alp has worked on web scraping/automation, data mining projects and full-stack web applications or APIs

9. Constraints and Risks

• Are there any social, ethical, policy, or legal constraints?

- Legality: although web-scraping is legal for most websites, there could still be some situations where web-scraping would infringe copyrights or the websites explicitly prohibits web-scraping in the terms of service
- Privacy: web-scraping of personal information and a lack of protection on the collected data could infringe personal privacy
- Potential customers: The Hurt Hub is a great way to connect with businesses interested in our service
- Resources: cloud computing services used for hosting our web application might be subscription based once the website traffic or computing burden exceeds a certain threashold, but we do not expect to have an overwhelming amount of traffic

• Will you have access to the data, services, and resources you need?

- Yes. The data will be available on the websites, the Hurt Hub procides connections, cloud computing services such as AWS provide free entry level plans to host our server and provide basic computing power.

• Is there anything else you might need?

- Our needs have been summarized above.

10. GitHub

Follow the instructions below:

1. One person creates a GitHub repository.
   - https://github.com/alpnix/SEO-Analyzer
2. Add other members to the repository as collaborators.
   - Done
3. Update your README.md file with the title of your project, group

number, and group members with roles. Example below:

- https://github.com/alpnix/SEO-Analyzer/blob/master/README.md

4. Add me (username: hlim1) to the repository as a collaborator.
    - Done
5. Create a folder called “Reports” in the main branch.
    - Done
6. In the folder, add this proposal. You will add all the reports to this folder in addition to the submission to Moodle.
    - Done
7. Take a screenshot of the ‘Collaborators’ page and add it to this section.
    - Done