Development and Implementation of Search Engine Optimization Algorithm using Angular Framework

Giorgi Kapanadze
Akaki Tsereteli State University
Master of Computer Science
Kutaisi, Georgia
Email: giorgi.kapanadze1991 [AT] gmail.com

Avtandil Bardavelidze
Akaki Tsereteli State University
Professor of Computer Science
Kutaisi, Georgia
Email: avtandil.bardavelidzec[AT] atsu.edu.ge

Abstract— **The paper deals with the development of search engine optimization algorithm and its integration into Internet browsers. In particular, the paper presents an effective search engine optimization algorithm and the algorithm is implemented using a client-side programming angular framework.**
The research algorithm and its implementation make the search process efficient and flexible for the user, which is reflected in the fact that frequently searched phrases will be automatically suggested.

Keywords- Search Engine Optimization, Algorithm, Client Side, Browser, Angular Framework;

I. INTRODUCTION

Search engine optimization is the process with the help of which a website created by us becomes more visible in the internet space. A few years ago Search engine optimization was not so popular, and today, when technologies are evolving and business is competing, it is essential that our business should be easily searchable in search engines with a combination of different words. Internet users search for text, sentences and mostly the first suggestion is the one they trust. Through it we can track the website we created, see who visited our site, what products were in demand, what products were most popular in search and so on. We can then do statistics on Search engine optimization observations and redistribute business logic accordingly to the relevant products. Also keep an eye on the grow of our business. As Search engine optimization relevance has increased so has the need for proper website optimization and tactics on how to place keywords in our software code. A few years ago there was a lot of competition in different search engines, however nowadays the search engine Google is relevant, therefore our goal is to make our website more searchable right here. In the first stage of creating SEO, the rules were fast and free, but then hackers put keywords and URLs that were favorable to them, in the search engine. Google saw the opportunity to do things that were not available in other search engines. It started working on algorithm updates. Since then, hundreds of algorithms have changed and SEO has evolved rapidly, forcing marketers to find alternative strategies. The history of SEO teaches us that the best way to prepare for the future of SEO is to create an algorithm, it should be to use ethical optimization techniques and publish content that includes real information for your visitors.

II. MAIN PART

The aim of the research is to use the above methodology and introduce a novelty that often stores searchable data in the browser's internal memory and offers the user the desired web resource according to the characters typed after entering the browser. Based on the analysis, [] we have identified how the Google search engine adheres to the principles of Search engine optimization, so after the appearance of the Javascript software language, the code written in this language can contain the correct SEO strategy, because Javascript uses the Google V8 engine. The V8 is an open source JavaScript engine developed by the Chromium Project, later Google Chrome. That's why the correct code written in this language should be easy to understand for the browser which will further help us in Search engine optimization. There are many very popular frameworks and libraries nowadays that help developers build more complex applications much faster and easier than before, such as react, angular, Jquery, and so on. [1-4]
It's all 100% JavaScript enabled. Developers need to know in-depth JavaScript before using these frameworks. The code written in these frameworks is very close to the principles of SEO. Search engine optimization can be used in our project in different ways, given frameworks offer relevant libraries for example angular offers Angular universal which makes our website 89% searchable,[5] it has some advantages for example that it is very easy to install, works on the following principle: Some part of the code works on the side of the server and some part on the side of the client. However, this

figure is unsatisfactory and it is often necessary for the website to be 100% searchable, in which case we have to set up an angular universal library as well as modify the code so that most of the code works on the server's side. This makes the code easy to read for the search engine and therefore easy to find the web page as well. After the project creation a web page index is created, by so-called bots. They supply the search engine, the search engine examines the index of frequently typed characters, and by computational algorithms shows our web page in the search engine. Often developers choose to create a website through WordPress when a good knowledge of the programming language is not necessary and they can engage in custom design and content modification, although this shows the necessity of using SEO and at the time the Platinum SEO Pack plugin helps them.[4-7] It generate meta tags automatically, which simplifies the content indexing process for search engines. There are also unscrupulous ways SEO high search services, they use fake web pages, manipulate keywords, create blank content, which might have a good resul but only for a short period of time but eventually you might lose your website and business. Achieving a good result with a conscientious way, requires a lot of hard work, at the right time we have to use the above mentioned ways, which do not promise 100% search guarantee of our page or we have to create the appropriate algorithm.

The research done through the solution is fulfiled by realizing the algorithm on the Angular framework, with the help of which the searching processes for users are effective and flexible, which was reflected in the fact that according to the functionality of the algorithm, other variants of phrases are often offered.

Angular is used to create large projects created by Google developers themselves, which helps us to use Search engine optimization from the very beginning, as it already has an integrated Google architecture, after which we can import Angular Universal in the appropriate order, in Visual Studio: ng add @ nguniversal / express-engine Then we use the command npm run dev: ssr, after which the web page is rendered on the server side, which remembers the browser and automatically suggests this site when login the next time, but the keywords and content will not be fully searchable, you need to solve a problem by introducing algorithm:

The basic idea of the algorithm is as follows: to store frequently searched phrases in the browser's internal memory and after opening the browser, to offer the user a web page of interest to him / her.

III. ALGORITHM

Algorithm stages are the following :

Step 1 - Search for characters or a set of characters typed on the keyboard in the browser's search field into the browser's internal memory.

Step 2 - Store the phrases found as a result of the first step in the browser's internal memory in an array specially created for it as a hash table object.

Step 3 - Find the most frequently searched terms using the array defined in the second step and copy them in to the new array if such phrases are not repeated or do not exist in the new array.

Step 4 - An array defined in the third step that lists frequently searched phrases that are not repeated or are not stored in the browser's internal memory, save in the browser's internal memory aka localstorage.

Step 5 - Frequently searched phrases are stored in the browser and it is possible to show the relevant result of the search phrases.

The implementation of the software code is as follows:

```
1) (keyup)="applyFilter()"

2)  public applyFilter(): void {
 if (this.searchKey == '') {// If the parameter is empty the function will take the same data
this.getDataAfterFilter () // Extract data to filter
  } else {// otherwise the function is passed the value parameter, which will be processed on the server side using the API, and if there is a corresponding value element will return the value as an object.
this.api.methodSearch ({FullName: this.searchKey}). subscribe ((res) => {
    console.log ("result", res)
// Then we need to store these values in the variable
let id = res.id; // Values must work in a global context
let name = res.name
   })
  }
 }
Public ElementData = new array[];
this. ElementData.push({id:this.id, name:this.name});
3) let NewArray = [];
  ElementData.forEach ((el, i) => {// We go through the elements and indexes of the above array
   ElementData.forEach ((element, index) => {// Take the element and an index again as an argument
    if (i === index) return null;
    if (element.name === el.name) {
// If the element's name matches the name of the argument and there is no corresponding element in the new array, we insert a new element
     if (!NewArrays.includes(el)) NewArray.push(el);
    }
   });
 });
 console.log("NewArray", NewArray)
}
4)  localStorage.setItem("NewArray ", JSON.stringify(array);

5)  ngOnInit(): void {
```

```
    var SavedArray = localStorage.getItem(' NewArray');
  }
```

We already have frequently searched phrases that we can extract in HTML

```
<div>
     <ng-container * ngFor = "let item of SavedArray;"> // ngFor is used to read an object from an array
<span> {{item.name}} </span>
                    </ng-container>
</div>
```

We already have users' frequently searched phrases about what they are looking for in the browser and then we can import frequently typed phrases into the project using the Meta Tag which manages the basic HTML code and the Title which dynamically loads the content.

```
import {Meta, Title} from '@ angular / platform-browser';
```

In the following main App component we create the seo.service.ts file, in which we do Search engine optimization management:

A service description is created in the constructor

```
constructor (private seoservice: SeoService) {
   this. seoservice.setTags ({
     title: 'Title', // A title for the search is created
     titleSuffix: '- Title', // The suffix of the title is created
     description: 'description', // Description
      keywords: 'Angular, React, Javascript, C ++, C # // Keywords used in search
   });
  }
```

After launching the code, the title will be created in the main component while initializating, during which the content will be updated and the relevant page will be loaded.

```
ngOnInit () {
  this.title.setTitle ('Welcome to our Website!');
  this.meta.updateTag ({
    name: 'description',
    content: 'Welcome to our website!'
  });
```

In the main class we describe the URL of our web page that should be easily searchable by the user: baseUrl: string = 'https://www.example.com/'

We also add what should be searchable

```
this.meta.addTags ([
        {name: 'daescription', content: 'How SEO works'},
        {name: 'author', content: 'George Kapanadze'},
        {name: 'keywords', content:' key, keywords, list}
      ]);
```

And we do what needs to be found and loaded.

```
      this.meta.updateTag ({name: 'description', content: " How Works Seo - updated '});
  }
```

The basic principle of the software code is as follows: on the first step, select the words, titles and descriptions that should be installed during the search, then on the second step, the relevant content is loaded in the browser.

With the help of library-created Search engine optimization, we got Angular Universal, we also manually created a search mechanism. Google's web search statistics are used to represent the results, Figure 1 and Figure 2 show the difference between how our web page was searched on the Internet and how its search was changed by the software code we added.

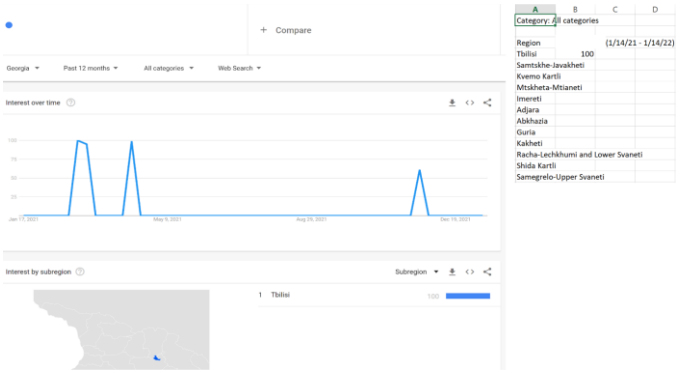

Figure 1

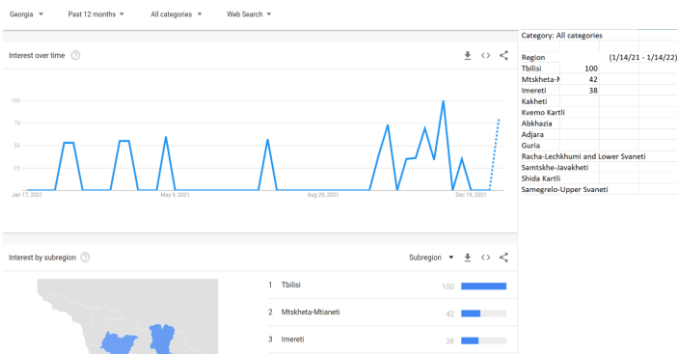

Figure 2

IV. CONCLUSION

The paper analyzes various approaches to the introduction of search engines using existing web technologies such as Angular Universal. As a result of the research, we obtained a search engine optimization algorithm, which was implemented and integrated in the Internet browser using an angular framework. Through which we find out the frequently typed phrases by the user and after opening the browser we offer the relevant web page, and after opening the web page the relevant products.

REFERENCES

[1] Ledford, J. L. (2015). Search engine optimization bible (Vol. 584). John Wiley & Sons.

[2] Gudivada, V. N., Rao, D., & Paris, J. (2015). Understanding search-engine optimization. Computer, 48(10), 43-52.

[3] Grappone, J., & Couzin, G. (2011). Search Engine Optimization (SEO): An Hour a Day. John Wiley & Sons.

[4] Veglis, A., & Giomelakis, D. (2019). Search engine optimization. Future Internet, 12(1), 6.

[5] Jain, A. (2013). The role and importance of search engine and search engine optimization. International Journal of emerging trends & technology in computer science, 2(3), 99-102.

[6] Saks, E. (2019). JavaScript Frameworks: Angular vs React vs Vue.

[7] https://app.pluralsight.com/course-player?clipId=96470f2c-2b96-40ae-83a9-027e6fdf8618