

Information Retrieval Final Project

Enoch Appiah (601.466), Samuel Muzac (601.466)

[smuzac1@jh.edu](mailto:smuzac1@jh.edu) [eappiah4@jhu.edu](mailto:eappiah4@jhu.edu)

Our final project centers on crafting a furniture shopping agent. Our shopping agent uses a short query of information for a type of furniture and uses those keywords to search for the most relevant pieces on furniture websites. Based on what's pulled, the agent uses the product names and product descriptions to model the relationship between those two elements and predict the name of a product, given the product descriptions.

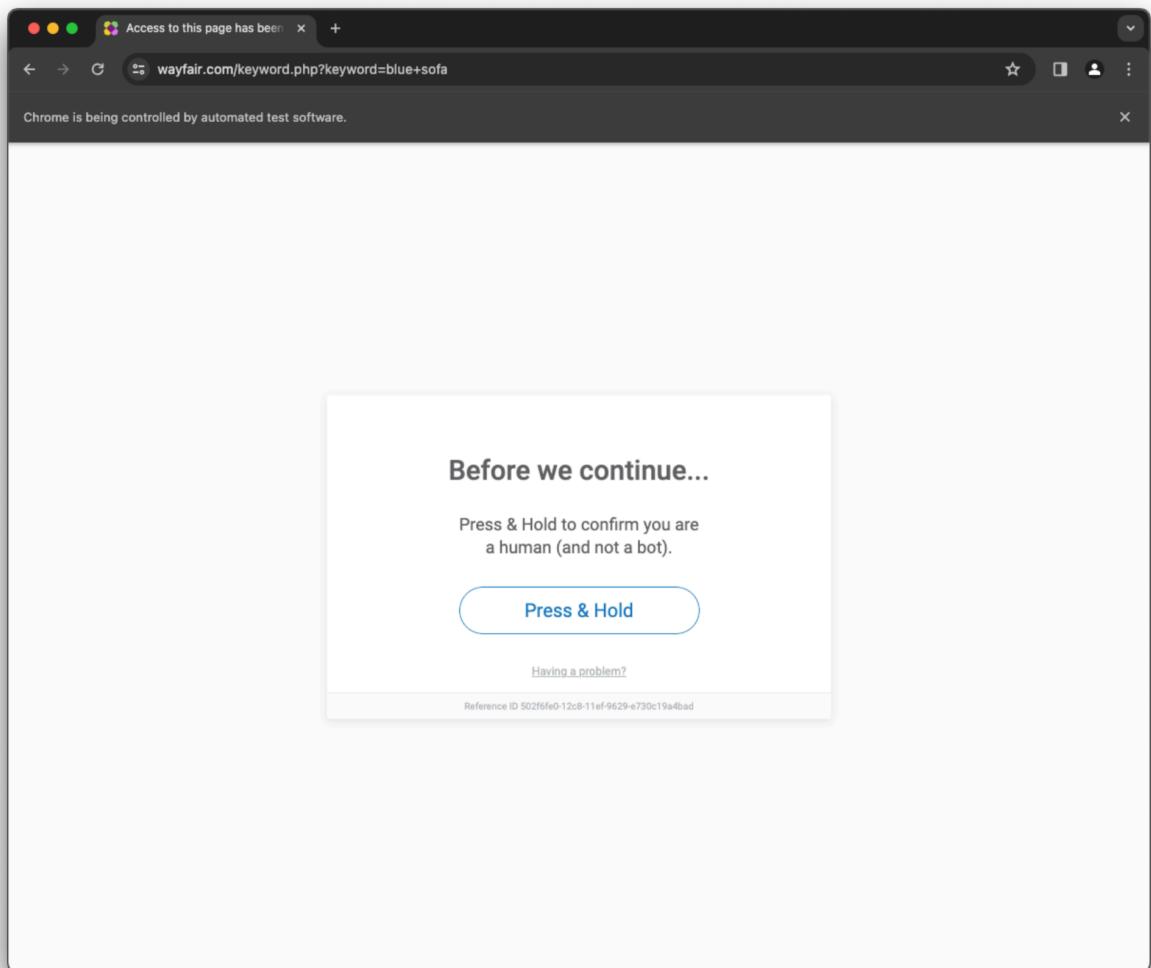
Our code is very easy to run. It requires the selenium , nltk, and gensim python libraries, which may need to be downloaded. We have a provided query implemented in the code, but if a user has a specific piece they're looking for, they can change the details within the code on the variable **query**. The user will need to watch the code as it runs through each website as there are pop-ups and bot checkers our shopping agent isn't able to click out of that interrupt the search process.

What our project does well is it's traversal through the many html elements to grab the description for each product. Sometimes, our code inputs the words into the search bar even if a pop-up appears on the page. Our code has built in timers to wait for the user to click out of any pop-ups and bot checkers, and to wait for the HTML elements to load.

A limitation of our project is there isn't a centralized way to extract the desired information from the website, so we're limited to three websites and a specific query. We encountered a lot of trouble with the html traversal part because each of the websites have different structures so a function is needed to traverse the website. Trying to generalize for a website by searching for a specific word through each div element was time costly and inconsistent. Another issue we encountered was the product pages weren't built with straight html, so BeautifulSoup couldn't be utilized fully and we had to rely on selenium.

For improvement, we would look more into web scraping and see if we can have a singular function to get to the products and descriptions. An extension we would do with additional time would be to employ more websites and even to utilize location. Say if I'm using the shopping agent from my hometown where I live near a Bob's Furniture. Since I live closest to Bob's Furniture, the agent can use the query with the furniture details on the other two or more websites, and end up using the extended query on Bob's Furniture to find the most relevant match.

Bot detection was a huge hurdle for us which led to data scarcity. We couldn't get around the bot checkers on websites like wayfair so we couldn't get more matched products in our vectors to test and train on. A shortcoming of our project is we don't have the most effective way to score/evaluate the accuracy of our model. We used the provided metrics import from sklearn but it doesn't tell us much about the model which could also be due to the lack of data. Perhaps, we should have used similarity functions to compare the product name and description.



This limited our project to use Bob's and Bed Bath Beyond's products, and the vector relationship between their products and description to predict the product name of or another website based on the given description, because of the limited data

With more time we could explore the relationship between the query and the product name/description and use that to find better matches of the product.

The vectors we were able to create had different dimensions, and we couldn't get them to match up before using sklearn built in methods. If we had more time we would've also tried to classify and predict query and product names and use the query expansion to improve the recall of product names.

Query used:

```
query = 'memory foam mattress'
```

Stiku 12 inch Cooling Memory | +

bedbathandbeyond.com/Home-Garden/Queen-Mattress-Ssecretland-12-inch-Gel-Memory-Foam-Mattress-in-a-B... ☆

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**Stiku 12 inch Cooling Memory Foam Mattress for Good Sleep, Mattress in a box**

17% OFF

★★★★★ 30

\$228.99 14% Savings

**From \$196.77**

Sale ends in: 1 day 22 hr

5% back in rewards! + Special Financing^ with an Overstock Credit Card

Free Shipping Over \$49.99\* Details

memory foam mattress

memory foam mattress topper

memory foam mattress queen

memory foam mattress king

memory foam mattress full

memory foam mattress

memory foam mattress pad

memory foam mattress twin

memory foam

Lucid Comfort Collection Lavender and Aloe Memory Foam... (2702)

Slumber Solutions Highloft Supreme 3-Inch Memory Foam Mattress... (6435)

Comforpedic Loft from Beautyrest 3-Inch Gel Memory Foam... (3078)

U B Energy 14" Queen Firm Mattress

← → ⌂ mybobs.com/mattresses/p/20082849003

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Dimensions: 60"W x 80"D x 14"H

Bob's everyday low price  
**\$999.00**  
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★★★ 

Slumber Solutions 14-inch Gel Memory Foam Choose Your Comfort Mattress - White  
**\$328.09**

Slumber Solutions 12-inch Gel Memory Foam Choose Your Comfort Mattress  
**\$277.59**

Stiku 12 inch Cooling Memory Foam Mattress for Good Sleep,Mattress in a box  
**\$196.77**

Stiku 12 inch Cooling Memory Foam Mattress for Good Sleep,Mattress in a box  
**\$196.77**

Slumber Solutions 14-inch Gel Memory Foam Choose Your Comfort Mattress - White  
**\$328.09**

query = "soft red Chair"

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1-60 of 109 Results ⓘ

## Soft Red Chair

Sort By Best Matched ▾

17% Off

Categories Furniture (99)

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Furniture / Living Room Furniture / Living Room Seating / Bean Bag Chairs

Single Lazy Sofa Teddy Fabric Soft Sponge Lounger Bean Bag Chair - Red

★★★★★ 0 ▾

\$376.00 18% Savings

**\$308.12**

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Query = "gray couch "

Bed Bath & Beyond | The Best

bedbathandbeyond.com

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BED BATH & BEYOND

gray couch

Furniture Rugs Bed

Trending: Outdoor Rugs, Outdoor Tables

select r

L

gray couch

The Gray Barn Downington Solid Wood 2-drawer Sofa...  
★ ★ ★ ★ ★ (81)

Parkhurst Tufted Grey Chesterfield Sofa by Christopher Knight...  
★ ★ ★ ★ ★ (28)

Baxton Studio Sorrento Mid-century Retro Modern Grey Fabric...  
★ ★ ★ ★ ★ (74)

Sales & Deals

17% Off

Brookside Kay Upholstered Wood Base Sofa - Light Gray

Brand: [Brookside](#)

★ ★ ★ ★ ★ 18

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Color (2): Light Gray

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Query = "blue sofa "

The screenshot shows the Bed Bath & Beyond website's search results for the query "blue sofa". The search bar at the top contains the text "blue sofa". Below the search bar, there are two main search results:

- blue sofa**: This result shows a large image of a blue sofa in a living room setting. Below the image is a product title and a star rating of 2 stars from 22 reviews.
- blue sofas**: This result shows a smaller image of a blue sofa and a matching ottoman. Below the image is a product title and a star rating of 3 stars from 8 reviews.

A prominent overlay window titled "Sign Up For Emails" is displayed in the center of the page. The overlay features a large blue "get 17% off" button, followed by the text "your entire order when you sign up for email". It includes a text input field for "Your email address" and a blue "Sign Up" button. At the bottom of the overlay, there is a small legal notice about terms and conditions and privacy policy, with a link to change email preferences.