

# Human-Computer Interaction: Heuristic Evaluation Technique

Lakshmikiran Nandula\*, Swathi Chitra Padmanabhan\*\*

\* Senior Lead Software Engineer, Capital One Services, LLC

\*\* Lead Software Engineer, Capital One Services, LLC

DOI: 10.29322/IJSRP.13.07.2023.p13927

<http://dx.doi.org/10.29322/IJSRP.13.07.2023.p13927>

Paper Received Date: 02nd June 2023

Paper Acceptance Date: 08th July 2023

Paper Publication Date: 14th July 2023

**Abstract-** Human-Computer Interaction (HCI) is a branch of Computer Science that is leveraged to explore and improve the interaction of humans with different types of Computer Interfaces like Applications on Personal Computer, WEB, Mobile Devices, Infotainment systems in cars, etc. In order to improve the user experience with these interfaces, designers perform different evaluations on the interface to figure out if there are any improvements that can be made to the Interface. This paper focuses on a specific area of Evaluation technique which is known as the Heuristic Evaluation Technique. The technique is used to measure the usability of the Computer Interface. Leveraging the Heuristic Evaluation Technique we are going to evaluate an existing interface of a website known as the craigslist.com.

**Index Terms-** Human-Computer Interaction (HCI), Heuristic Evaluation, Interface Redesign, Interface Justification, Craigslist

## I. INTRODUCTION

Human-Computer Interaction (HCI) is a field of study that focuses on the design, development, and evaluation of computer systems and their interfaces. One important aspect of HCI is evaluating the quality of the user interface of a system. Here are some commonly used interface evaluation techniques:

1. Usability testing: This involves observing users as they attempt to complete tasks using the system. The goal is to identify any usability problems that may exist in the interface, such as confusing menus or hard-to-find features.
2. Heuristic evaluation: In this technique, a group of evaluators (usually usability experts) inspect the interface and identify potential usability issues based on a set of established design principles or "heuristics".
3. Cognitive walkthrough: This technique involves simulating how users might approach a task using the system and evaluating the interface's ability to support them at each step.
4. A/B testing: This involves comparing two different versions of the interface (often with different design elements or layouts) to see which one performs better in terms of user satisfaction, task completion time, or other metrics.
5. Expert review: This involves having a usability expert evaluate the interface based on their experience and knowledge of usability principles.
6. Surveys/questionnaires: These can be used to gather feedback from users about their experience using the system, such as their level of satisfaction or ease of use.

Overall, the choice of evaluation technique depends on the goals of the evaluation, the characteristics of the system being evaluated, and the resources available for the evaluation. In this paper, we are going to leverage the Heuristic evaluation technique to inspect an interface and figure out any issues with the interface.

Heuristic evaluation is a process where experts use rules of thumb to measure the usability of user interfaces in independent walkthroughs and report issues. Evaluators use established heuristics (e.g., Nielsen-Molich's) and reveal insights that can help design teams enhance product usability from early in development. <sup>[2]</sup>

Heuristic evaluation involves a group of evaluators who independently evaluate the system based on a set of predefined usability heuristics. The evaluators identify usability problems and suggest improvement solutions. The results of the evaluation are then compiled and analyzed to determine the severity of the problems and the areas of the system that require improvement.

Heuristics are the principles against which a computer system is evaluated, among many such principles the 10 principles that help do a Heuristic Evaluation of HCI according to Nielsen-Molich<sup>[3]</sup> are listed below:

1. Visibility of System Status:

The system should be able to keep its users updated with all the changes they are making from a user experience standpoint and seek feedback on a regular basis to improve the overall experience. This builds the user's trust in the system and the system will receive some valuable feedback going forward without even requesting the same.

2. Match between the system and the real world:

Users should be able to use the system intuitively, if you are redesigning an interface that is already out there, like Google.com, you would want to add a Search Text Box with a Search button right next to it, so any new user who used Google would be able to relate to your design. In a more complex UI, use terminologies and images which are familiar to the user rather than using technical jargon that is used by your team. This will help the users use your system seamlessly and intuitively.

3. User Control and Freedom:

Users need control of the UI and the freedom to navigate the UI with the ability to edit and save their changes. Easy exit strategies would enable users to safely exist if they are not sure of their actions. This builds confidence in using the UI without fear of making mistakes and getting confused about how to use the same.

4. Consistency and standards:

Maintain consistency within the UI interface lining up with the same experience that users will have on other interfaces. This reduces the cognitive load on the user to learn something new. For eg, traffic signals and their meanings, in most countries you will find the same colors and signals and they mean the same thing. This ensures that visiting population doesn't have to learn from basics. They just need to know which side of the road to drive on and when to take turns and some additional roadside signals.

5. Error Prevention:

Prevent errors from happening in your interface, address the high-severity errors first so that users would not make those mistakes while interacting with your interface. This will prevent dropout rates from the user interface and user frustration.

6. Recognition rather than recall:

Make all the options on your UI visible, users don't have to remember everything to use your website. Humans have less short-term memory and can't remember what you have on the UI for them. Making all the options visible and easily navigable, clearly labeling accordions and tabs, will help people navigate the UI seamlessly.

7. Flexibility and efficiency of use:

Provide options on the UI that both Novice and expert users can use, so that both inexperienced and experienced users can use the same UI without any difficulties. Providing shortcuts for navigation will help experienced users speed up their interaction with the UI.

8. Aesthetic and Minimalistic Design:

Keep the information on the UI to minimal details needed to interact with the system. Noisy UI will lead to higher dropout rates. Leverage subtle colors to make the UI more readable.

9. Help users recognize, diagnose and recover from errors:

Present users with meaningful error messages and symbols related to what the error is and the action that needs to be taken in order to move forward. Technical Jargon which only the team understands will not help the user.

10. Help and documentation:

The user interface being minimalistic sometimes needs documentation and help for the users to be able to navigate the user interface.

## II. USER INTERFACE FOR RESEARCH

The interface we picked to perform Heuristic Evaluation on is <https://craigslist.org>. Craigslist is a very popular website and the current interface was designed in the year 1995 since then it has remained the same as a link-based application. Craigslist is used by people across 70 countries to buy and sell things locally and submit Job requests. The site serves more than 20 billion page views per month, putting it in 72nd place overall among websites worldwide and 11th place overall among websites in the United States (per Alexa.com on June 28, 2016), with more than 49.4 million unique monthly visitors in the United States alone (per Compete.com on January 8, 2010). With more than 80 million new classified advertisements each month, Craigslist is the leading classifieds service in any medium.<sup>[4]</sup>

The number of unique visitors to the website indicates the popularity and word of mouth the platform receives for the services rendered. It also presents an opportunity to improve the learning experience for new users and provide shortcuts to the existing users who are familiar with the overall experience.

## III. APPLY HEURISTIC EVALUATION

Applying the principles of Nielsen-Molich<sup>[3]</sup> to Craigslist will help us narrow down the areas of improvement for the website. We will go one principle at a time and look for the areas within the website where that principle is helpful. Let's jump right in and start the evaluation process.

1. **Visibility of System Status:** As described above, this step informs the user about any recent changes to the websites or the changes they made to the overall user experience. This includes the system health as well, sometimes some of the capabilities within the Website are not functional or under maintenance. This heuristic also includes page transitions, the loading of any images, and the revolving 'in progress' status after any page submissions. Providing a Transparent status on any functionality that is not working. This will help the regular users of the websites like Craigslist for eg. resellers will be made aware of the changes made and how their experience with UI is going to be different.

The left image below shows the System Status within Craigslist and when you click on the link it redirects you to the page which is shown on the right. The page shows that there are 2 events, one is a maintenance event and the other one is broken images on a few pages. Even for the Broken Images issue, there are not many details in terms of which pages or sections on the website were broken and how would that interfere with the user's experience. Having a detailed message explaining what's broken and when it would be fixed will set a clear expectation for resolution and meet the users' expectations.

The maintenance message is also pretty dated and not an active issue, these kinds of system health issues should be archived if resolved. Active Issues should also show up on the top of the home page to let the users know there is an issue with overall system health, right when they land on the website and which actions are restricted/impeded on the platform due to the issue.

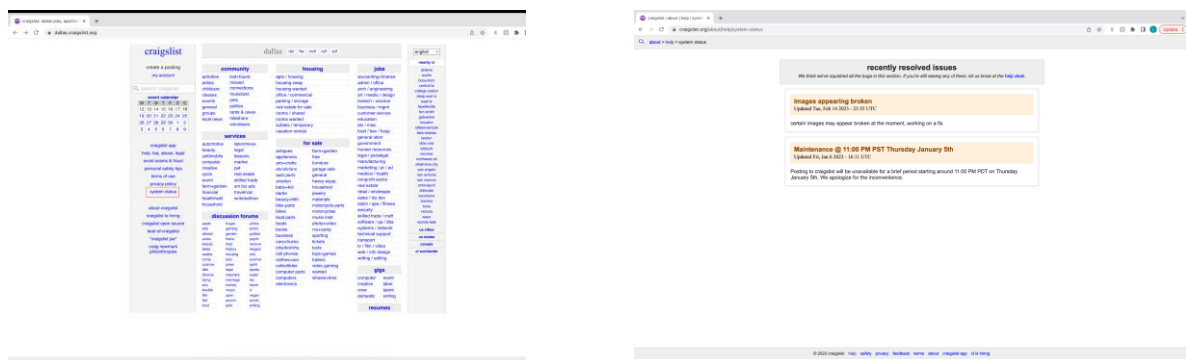


Fig. 1

2. **Match between the system and the real world:** Craigslist has a lot of categories and a ton load of functionality which allows users to perform different actions on the UI. Some of those categories are very intuitive and self-explanatory like

`apts/housing` (Housing), and computer (Services). As you can see they are clear and users can easily understand if they click on those links, they will be navigated to the child pages to find an apartment or home for rent. Similarly, posts related to Computer Service providers mostly businesses under computer categories are pretty intuitive. Likewise, most of the other categories within the page are very intuitive and relate to the real-world usage of these terms.

- User Control and Freedom:** Users of Craigslist can make mistakes while creating a Post, eg. Deleting a Post accidentally or Drafting a new Post and submitting it too soon. The UI should provide controls to quickly revert the mistake and provide undo capabilities. Similarly based on the guidance for User Control and Freedom from the principles of Nielsen-Molich<sup>[3]</sup>, UI should provide navigational capabilities like going back to the previous page without losing information. On Craigslist, users can quickly navigate to the previous page they were on, and the UI retains any filters that the users tried to leverage on search. The close and cancel actions are also very implicit and easy to understand. Users are familiar with what happens when we click on those links and don't have to learn a new way of navigation to understand the UI.
- Consistency and standards:** Usage of standard icons and controls on the UI which are common industry standards and the users don't need a learning curve to grasp these controls. Craigslist has some features that align with consistency and standards, Blue links on all the hyperlinks allow the users to navigate the entire website, which is a very consistent way of representing hyperlinks. Craigslist has a little inconsistent layout within each of the sub-pages that you open. Every page has a different layout. This is one area that the site can improve and provide a consistent look and feel, this way any user who regularly uses the site, can easily switch between different categories and it will improve the engagement of the users with the website. Take a look at the inconsistency between the two layouts for the Housing and Education categories.

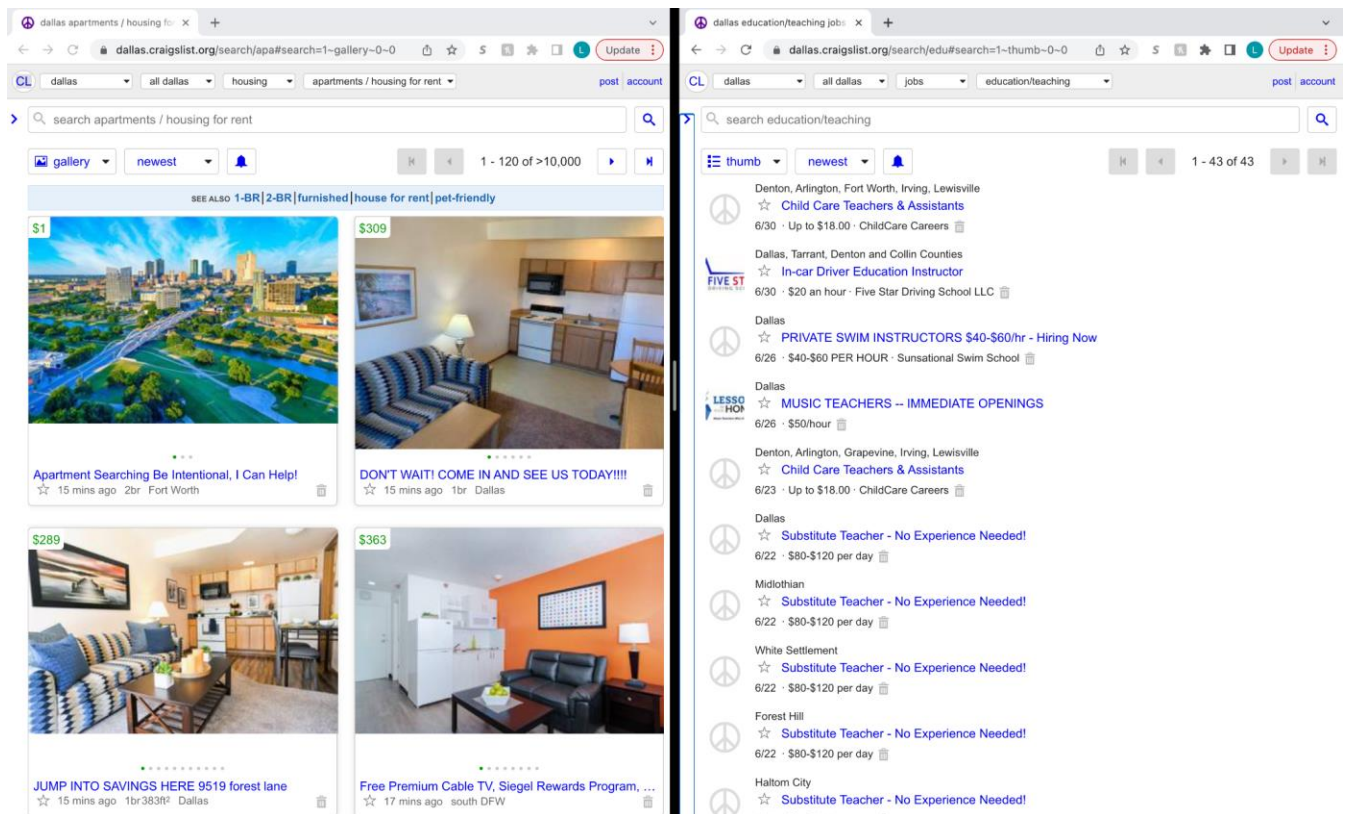


Fig. 2

- Error Prevention:** This heuristic is used to evaluate if the UI provides preventive controls for users to not make mistakes. these can be providing drop-down options, and date pickers, allowing an error-free experience for the users. Users should not see error messages later in the process, especially the ones that could be prevented by the controls on the UI. Use Auto population features in the UI to help users fill out any posts quickly. The alerts on the Post page of Craigslist provide error messages for all the empty fields, which is a pretty standard requirement these days.

**Some required information is missing or incorrect.**

**Please correct the fields marked in red:**

All postings must have a title.

All postings must have a description

Please supply a value for the 'parking' field.

Please supply a value for the 'laundry' field.

Please supply a postal (ZIP) code.

Please indicate if this has a private bath or not.

Please include a valid email address so we can send you a confirmation email. If you wish the email address to remain private, pick the appropriate option below the email field.

<b>posting title</b>	<b>city or neighborhood</b>	<b>postal code</b>
<input type="text"/>	<input type="text"/>	<input type="text"/>

Fig. 3

- Recognition rather than recall:** The actions on the UI should be consistent with other UIs, and the images and logos/symbols used to denote actions should be similar to most of the UIs which provide similar capabilities. Users can't recall most things if they are not using the site regularly. They can recognize the actions like the forward icon to move ahead on the page. Eg. X icons on the top of the Pop Up overlays let users know that they can close this window once they have reviewed the information. In Fig 4. below, you can see that the forums structure is not a very familiar structure, there is a topic on the top, then instead of comments, threads as icons under them, there are a few dots depicting a child thread/comment. Instead of that if Craigslist can provide a structure familiar to other UI like comments in Facebook/Instagram, or Reddit Threads, Users would recognize the structure better.

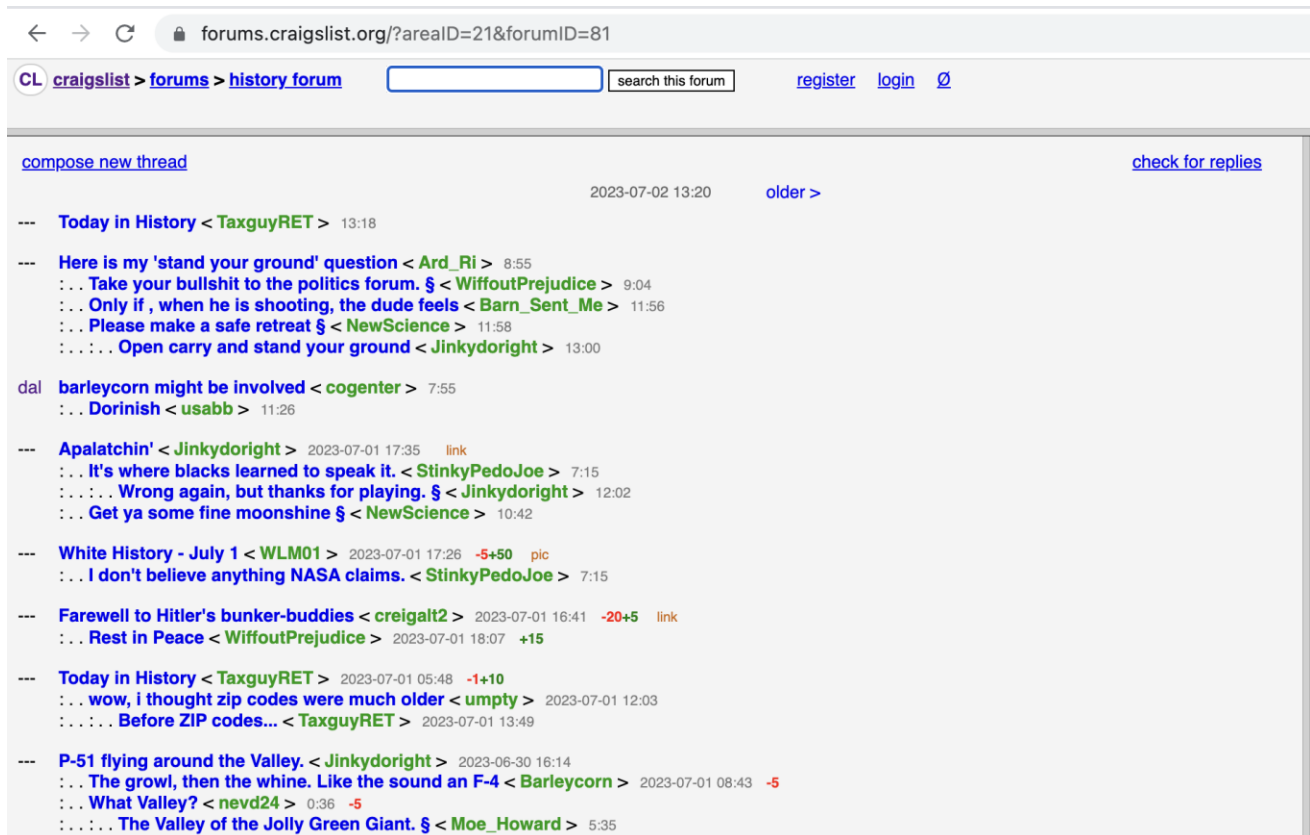


Fig 4

- Flexibility and efficiency of use:** This heuristic allows users to perform the same tasks in multiple ways giving them the flexibility of learning the system initially and start using shortcuts as they become more familiar with the UI. In the case of

Craigslist, the users typically use the website to post about selling or buying something. The create a posting section as shown in the figure below follows the same set of steps irrespective of the user's experience with the site. This could be right in this case, as not a lot of them use the website frequently or repeatedly. But let's say someone is moving out and want to put a moving out sale, they need not share all their details frequently and could benefit from a shortcut like creating multiple posts with similar details and changing a few fields, or leveraging a template for creating a post.

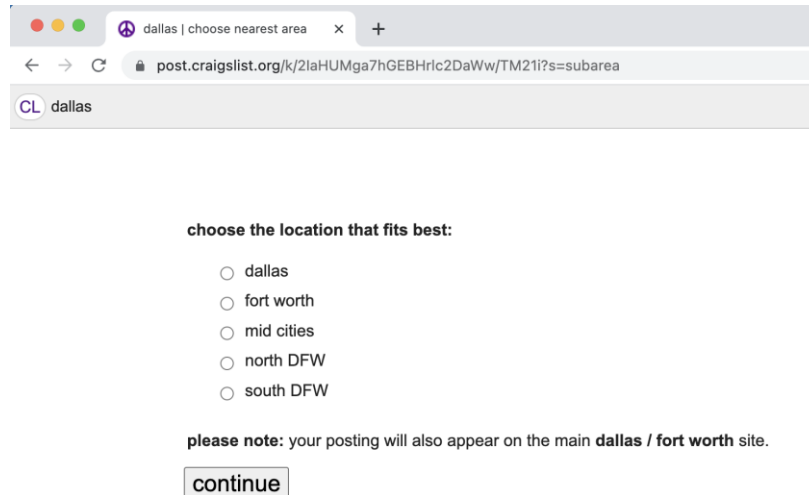


Fig 5

8. **Aesthetic and Minimalistic Design:** The heuristic is focused more on the look and feel of the overall website. Some of the important elements to analyze for this heuristic are Streamlined and clean visuals, Clear Information hierarchy, Intuitive Navigation, Consistency, Visual hierarchy and Scannability, Minimalistic Forms, and Interaction. In Craigslist's case, some of these elements are present, while others are not. The homepage as seen in Fig 1, has a clear information hierarchy, all the listings are sorted and ordered in separate categories. Navigation is very intuitive as everything is link based and easy to navigate. Visual hierarchy is a mixed bag, some interfaces have a natural hierarchy like creating a new post while discussion forums (Fig 6) do have a hierarchy but they are not Scannable. The forms are minimalistic on most of the micro pages.

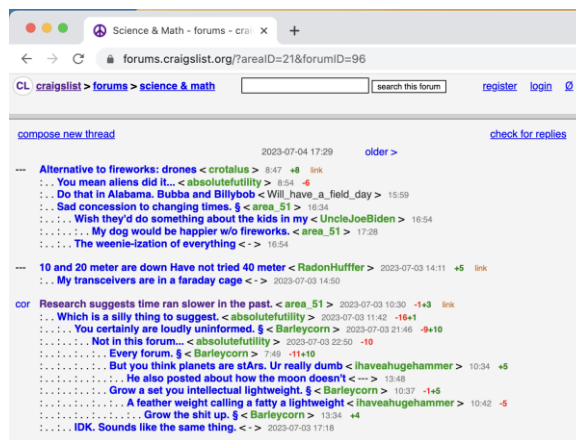


Fig 6

9. **Help users recognize, diagnose and recover from errors:** This heuristic helps users with clear and informative error messages, visual indicators and feedback, help documentation and support, contextual help and onboarding, and graceful error handling. Let's evaluate how Craigslist is doing in this heuristic. As you can see in Fig 3, the UI provides clear error

messages for the form's mandatory fields, which is helpful to the users to recover from the error and enter the right information to create a Post.

- 10. Help and documentation:** The heuristic suggests creating a dedicated space within the interface where users can reach out for help. Like a Contact Us section to reach out to agents with specific questions. There is a specific page for help, which highlights different categories a user can view for specific help on any topic within the website (Fig 7). We have seen different error messages which provide contextual help to user when they are navigating through the website.

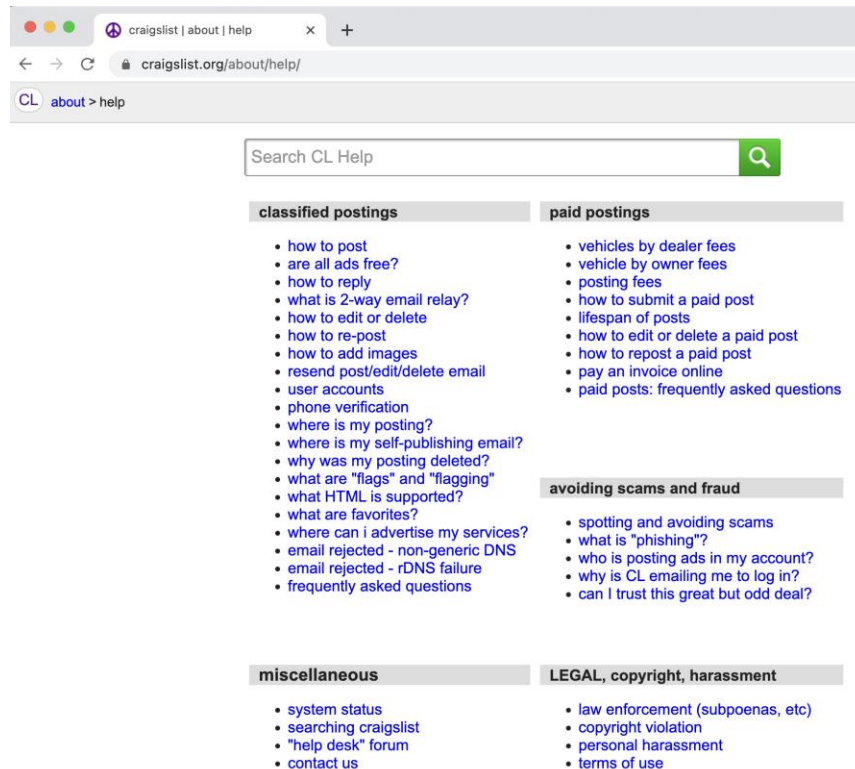


Fig 7

## V. CONCLUSION

In summary, we have seen the different heuristics and how we can perform a heuristic evaluation on a website. While doing the evaluation we can find that some of the websites are really well designed and has room for improvement only in certain cases. Apply the heuristic technique on an interface and iterate on those as you improve the interface. This paper can serve as a guide on how to perform a heuristic evaluation on an Interface as an example. The principles allow users to create Interfaces which provide a satisfying experience to users and help them navigate the interface in a user-friendly manner, providing all the help and flexibility with clear and concise documentation.

#### REFERENCES

- [1] Human–computer interaction. (2023, April 26). In *Wikipedia*. [https://en.wikipedia.org/wiki/Human%E2%80%93computer\\_interaction](https://en.wikipedia.org/wiki/Human%E2%80%93computer_interaction)
- [2] Heuristic Evaluation (2023, April 28). <https://www.interaction-design.org/literature/topics/heuristic-evaluation>
- [3] Ten Usability Heuristics. Jakob Nielsen (1994, April 24), <https://www.nngroup.com/articles/ten-usability-heuristics/>
- [4] Wikipedia contributors. Craigslist. Wikipedia, The Free Encyclopedia. June 7, 2023, 09:39 UTC. Available at: <https://en.wikipedia.org/w/index.php?title=Craigslist&oldid=1158961297>. Accessed June 17, 2023.

#### AUTHORS

**First Author** – Lakshmikiran Nandula, M.S Computer Science, Georgia Institute of Technology and  
Lakshmikiran.Nandula@gmail.com

**Second Author** – Swathi Chitra Padmanabhan, B.Tech Mechanical Engineering and Swathichitra.Padmanabhan@gmail.com.