

Technical Disclosure Commons

Defensive Publications Series

May 31, 2018

Providing link suggestions based on recent user activity

Jakob Foerster

Matthew Sharifi

Follow this and additional works at: https://www.tdcommons.org/dpubs_series

Recommended Citation

Foerster, Jakob and Sharifi, Matthew, "Providing link suggestions based on recent user activity", Technical Disclosure Commons, (May 31, 2018)

https://www.tdcommons.org/dpubs_series/1215



This work is licensed under a [Creative Commons Attribution 4.0 License](https://creativecommons.org/licenses/by/4.0/).

This Article is brought to you for free and open access by Technical Disclosure Commons. It has been accepted for inclusion in Defensive Publications Series by an authorized administrator of Technical Disclosure Commons.

Providing link suggestions based on recent user activity

ABSTRACT

Web browsers typically include a navigation bar to enable users to enter URLs or search phrases. The browser often supplies suggestions to complete a URL or search-phrase when the user types a first few characters into the navigation bar. This disclosure provides techniques to provide link or URL suggestions based on text that was recently copied or highlighted by a consenting user. The text is classified into one or more types, e.g., geographical addresses, product categories, foreign language, etc., using a machine learning model. A map is established between text types and URLs associated with such types. When the user activates a navigation bar, e.g., by clicking on it or starting to enter characters, URL suggestions are offered that are based on the map. In this manner, recent context of the user is utilized to improve quality of suggestions or recommendations.

KEYWORDS

- Autocomplete
- Browser
- Clipboard
- Navigation bar

BACKGROUND

Navigation bars within web browsers or other networking clients enable users to enter URLs or search phrases. The navigation bar is often used for quick navigation to certain pages or to take actions. Some web browsers are capable of providing suggestions to complete a URL or search-phrase when a user enters the first few characters of the URL or search-phrase. For example, if a user types “tr” then an auto-completion feature of the web browser might suggest

“translatoroflanguages.com,” or “travelleraroundtheworld.com,” or search-phrase suggestions that match the text “tr.” Users save time by selecting suggestions from the navigation bar, and also benefit, e.g., when they are unsure of the spelling, or do not have a complete understanding of the search topic.

A shortcoming of current auto-completion systems is that user context is not utilized to provide suggestions. In the above example, it is unclear if the initial typing of the letters “tr” indicates an intent on the part of the user to head to a language-translator website, or a travel website.

DESCRIPTION

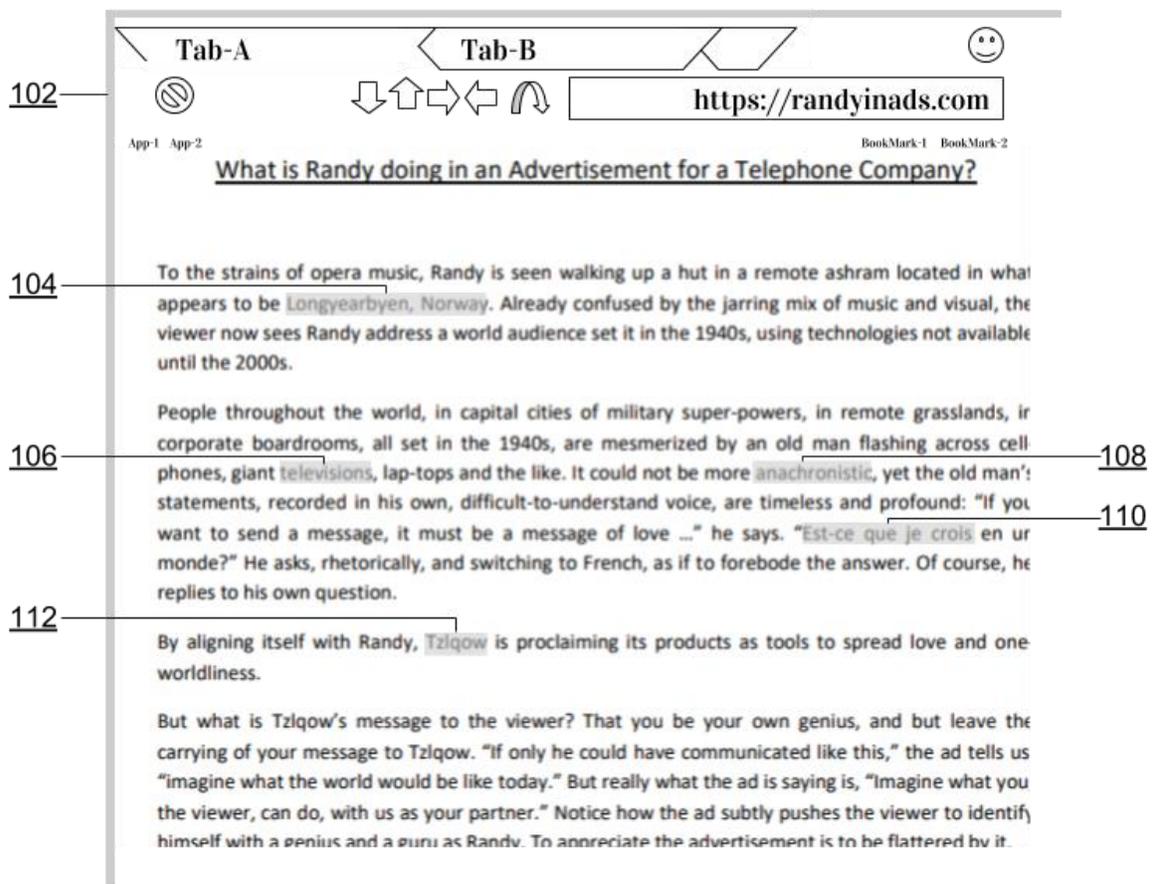


Fig. 1: Navigation bar suggestions based upon recently-copied or highlighted text

With user permission, the techniques of this disclosure analyze recently copied (or highlighted) text. The techniques are implemented only upon specific user permission, and users are provided with options to turn the features off. When users provide permission, the type of the copied or highlighted text or other derived information to provide URL suggestions, e.g., in the navigation bar.

The techniques are based on the correlation between the text and the use of such copied/highlighted text as search terms or URLs. This is illustrated by the example of Fig. 1, which shows a user currently browsing a page using a web browser or other client (102). If a consenting user highlights a string (104) that indicates, e.g., the name of a place, then the autocomplete system weights URLs relating to travel, cartography, etc. more heavily than other matching links. If the user then types “tr” into the navigation bar, the auto-completion system is more likely to recommend “travelleraroundtheworld.com” than a language-translation service.

Similarly, if the user highlights a string (110) that is written in a foreign language or script, then the autocomplete feature assigns a higher weight URLs relating to language translation, etc. such that these URLs are more likely to be provided as autocomplete suggestions. If the user types “tr” into the navigation bar, the auto-completion system is more likely to recommend “translatoroflanguages.com” than a travel website.

Similarly, if the user highlights a string (106) that indicates, e.g., the name of a product, then the autocomplete system is configured such that e-commerce, product-review, or similar URLs, are more likely to be recommended. If the user highlights a string (108) that indicates a relatively rarely-used word, then the autocomplete system recommends dictionary, thesaurus, or similar resources. If the user highlights a string (112) indicative of a brand name, then the

autocomplete system provides suggestions relating to that brand, etc. In this manner, the techniques of this disclosure enable the user to easily access the URL of intent.

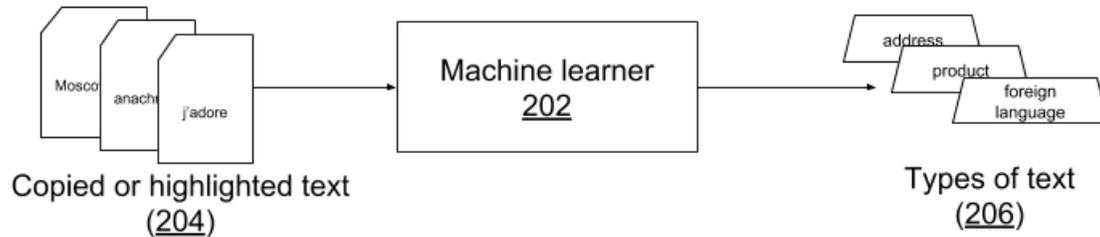


Fig. 2: Classification of copied/highlighted text into types

As illustrated in Fig. 2, when text is highlighted or copied into clipboard (204), and is permitted by the user for use in providing suggestions, a machine learning model (202) analyzes the text and classifies it as a certain type (206), e.g., geographical address, product category, foreign language, etc. The model indicates an other or unknown type when the text is unclassifiable. The model is trained on a set of labeled examples of text with the corresponding type. The labeled examples are obtained from users that provide consent for use of labeled text for training a model. The machine learning model is configured to perform the classification locally, e.g., such that no data leaves the user computing device.

A mapping is stored between text types and links. For example, text of type “geographical addresses” may map to cartographic sites, text of type “product categories” may map to e-commerce websites, etc. The type-to-domain map may be stored on a user device, on a server or a combination. Based on the result of classifying the clipboard text, the type is looked up in the type-to-domain map and is used to retrieve a set of candidate URLs. With user consent and permission, the candidates are further scored, e.g., based on sites a user frequently interacts with. The links thus obtained are displayed to the user in the navigation bar, e.g., as suggestions, or are used to provide suggestions once a user starts to enter a prefix string.

Another factor utilized, upon user permission, includes the time elapsed since the user last copied or highlighted text, e.g., since the correlation between clipboard content and search intent may decrease with time. After a predetermined amount of time after copy/highlight action, e.g. a minute, the suggestions are weighted less based on clipboard content, or the clipboard content may be ignored.

The machine classification model can be any type of neural network that processes text. For example, it may be a recurrent neural network, e.g., an LSTM network, which processes a sequence of tokens or characters. Alternatively, it may be a convolutional neural network, or other machine learning models, e.g., support vector machines, random forests, boosted decision trees, etc. The model may consist of multiple layers of hidden nodes, which derive higher level representations from the lower level features.

In situations in which certain implementations discussed herein may collect or use personal information about users (e.g., user data, information about a user's social network, user's location and time at the location, user's biometric information, user's actions on a device, user's activities and demographic information), users are provided with one or more opportunities to control whether information is collected, whether the personal information is stored, whether the personal information is used, and how the information is collected about the user, stored and used. That is, the systems and methods discussed herein collect, store and/or use user personal information specifically upon receiving explicit authorization from the relevant users to do so. For example, a user is provided with control over whether programs or features collect user information about that particular user or other users relevant to the program or feature. Each user for which personal information is to be collected is presented with one or more options to allow control over the information collection relevant to that user, to provide

permission or authorization as to whether the information is collected and as to which portions of the information are to be collected. For example, users can be provided with one or more such control options over a communication network. In addition, certain data may be treated in one or more ways before it is stored or used so that personally identifiable information is removed. As one example, a user's identity may be treated so that no personally identifiable information can be determined. As another example, a user's geographic location may be generalized to a larger region so that the user's particular location cannot be determined.

CONCLUSION

This disclosure provides techniques to provide link or URL suggestions based on text that was recently copied or highlighted by a consenting user. The text is classified into one or more types, e.g., geographical addresses, product categories, foreign language, etc., using a machine learning model. A map is established between text types and URLs associated with such types. When the user activates a navigation bar, e.g., by clicking on it or starting to enter characters, URL suggestions are offered that are based on the map. In this manner, recent context of the user is utilized to improve quality of suggestions or recommendations.