

Evaluation of autocompletion on text copy Tasks

Introduction

Text inputs requires the user to enter each letter on its own. This way of typing opens up many ways for typing mistakes, fatigue and general repetition exhausting the user in longer typing sessions.

Natural languages consist of a list of set words, allowing for text prediction on given inputs.

Input technique and design

In the following experiment an auto complete method should be examined. Therefore, five German pangrams are presented after each other and the participant has to copy them in a text input field right below the text. Pangrams are sentences consisting of all or most letters of the alphabet, in this case Umlaute (äöü) and the German "ß" are excluded. Pangrams are chosen as every key has to be pressed at least once and they contain both common and uncommon words.

While typing, an autocompletion field is shown to some users, displaying a list of words starting with the so far typed letters. The user then can use the arrow keys to select a word and then the enter key to paste it into the text. A sentence is completed by pressing enter without having a prediction displayed and having e. The double allocation of the enter-key was chosen as it is commonly used as a validation-key. User should intuitively keep typing so the space button was discarded.

Study

The study was conducted with 4 participants. The participants have to complete the program twice while their order of getting auto completion support was alternating. The pangram sentence ordering was switched for 2 of the participants in order to counter balance bias. The sentence ordering is randomized before every trial.

A short introduction is read out before each first trial, so the participants know their tasks. After the first trial the participant is reminded on the availability of auto completion assistance.

“Im Folgenden sollst du den dir oben gezeigten Text in das Feld darunter tippen. (Dabei/Jetzt steht dir eine Autovervollständigung zur Verfügung, die du mit der Enter-Taste übernehmen kannst. Du kannst jedoch auch weiter tippen oder mit den Pfeiltasten einen der Vorschläge auswählen. Die Groß- und Kleinschreibung der Vorschläge wird für den Text automatisch angepasst) Bist du am Ende eines Satzes angekommen kannst du mit der Enter-Taste diesen abschließen. Versuche so schnell und fehlerfrei wie möglich zu tippen.“

Participant	Trail 1	Trail 2
1	Completer ON	Completer OFF
2	Completer OFF	Completer ON
3	Completer ON	Completer OFF
4	Completer OFF	Completer ON

Variables

Independent Variables:	typing speed per Word
Dependent Variables:	Autocompletion enabled or disabled
Controlled Variables:	Keyboard: MacBookPro 13" 2016, German Layout Location: Private flat Time: Evening, Wednesday
Confounding Variables:	Familiarity with keyboard
Random Variables:	Ghosting Random Enter-Presses.

Participants

As participants 4 students from different fields were selected. The participants were between the ages of 21 to 24. Neither of the 4 participants described themselves as a 10-finger-typer, which resulted in the drop of the confounding variable "typing skills".

Keyboards of Apple computers differ in their layout from usual keyboards, but all the keys need for the task are similarly places on both systems. It is noted that some participants use Macs themselves.

Results

It is to be expected, that trails with auto completion assistance yield faster results than trails without.

The analysis was done in a Jupyter Notebook. All CSV-files were merged with pandas, which was also used for filtering and creating dataframes to visualize. Matplotlib provides the graphs.

The first scatterplot shows the distribution word typing times by trails. Y-axes were adjusted for easier visual comparisons.

Out[40]: (0, 9)

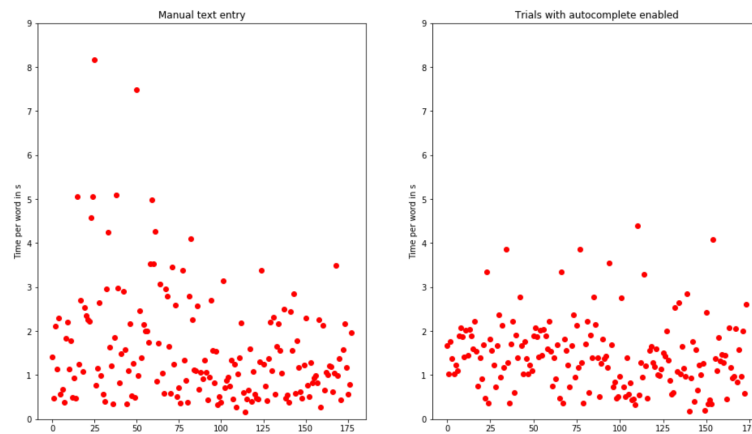


Figure 1 Scatterplot

As can be seen from the *Figure 1*, both stimuli look similar but manual text typing produces heavy outliers. The more detailed analysis using boxplots reassures this. The average time of entering a word is around 1.3 seconds.

Boxplot grouped by autocomplete

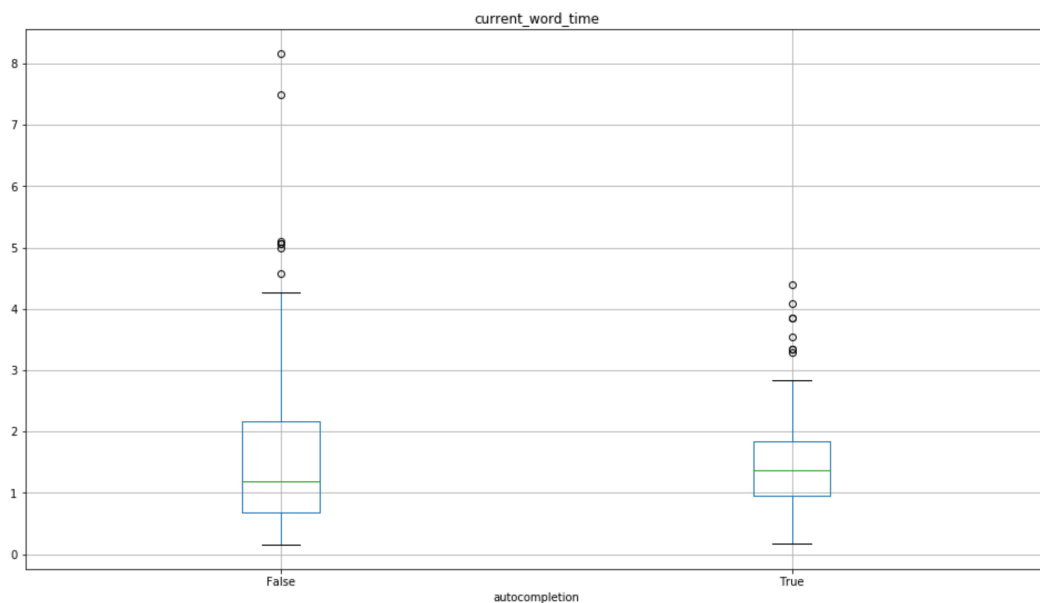


Figure 2 Boxplot. False means the autocomplete feature was disabled, True indicates that the feature was available

Out of 174 word, only 50 weren't typed without the auto complete feature, indicating a good user reception of the feature.

[50, 124]

(-1.1102786402036586,
1.1156174992513634,
-1.1178367860926188,
1.1008493707663152)

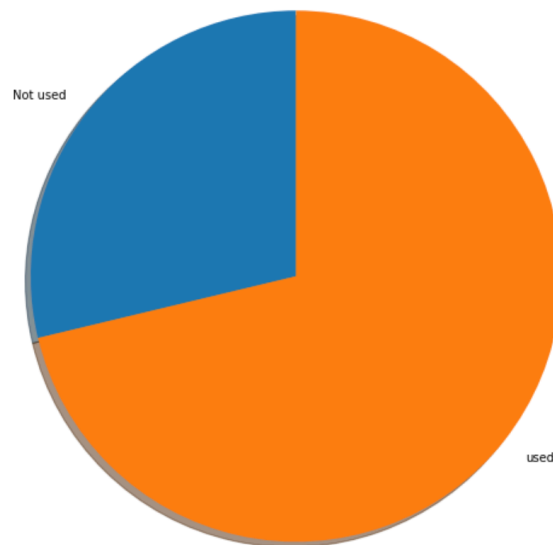


Figure 3 Piechart showing the distribution of used autocompletion

A final students t-test could not be conducted. As no errors are logged, corrections can trigger the word finished event multiple times (174 words for auto complete, 178 words for manual).

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