ChibiPoint: Accessible pointing for Web Applications

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Abstract

Web applications such as Facebook are designed for use with pointing devices like mice. Such hardware is not always available (for example on devices like games consoles, or when the user is disabled). We designed, implemented and evaluated a pointing mechanism that maps to less expressive input methods, i.e. key sequences. It contributes to a more effective and efficient keyboard-based pointing system than the 'tabbing' navigation currently used in web browsers.

Introduction

The standard 'tabbing' navigation mechanism recommended for accessible web development was felt to require too many keypresses to be accessible to a repetitive strain sufferer. It traverses all clickable elements on a webpage, with no mechanism for skipping. It is heavily dependent on accessible markup; the next element in traversal cannot be predicted in advance. Worse still, focus can be entirely unknown when no visual indicator is provided. Standards prescribe making websites more tab-accessible[1], but the pointing mechanism is challenging to support[2], and inefficient even if accommodated.

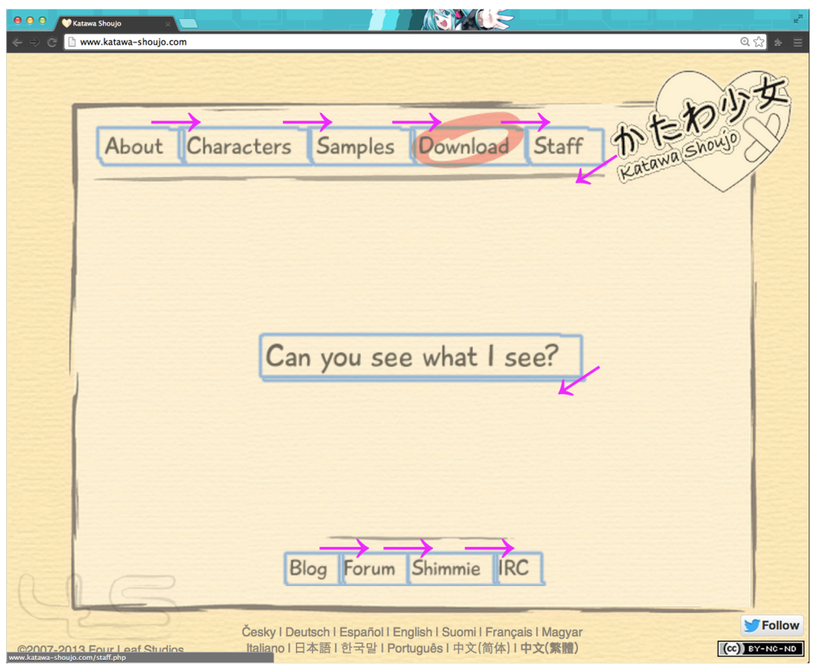
We created ChibiPoint to address these problems. Pointing is made efficient by allowing the user to describe the screen area their target exists in, and refine this description further if necessary, drilling through screen space in $\log_9$ time. The user can aim at their target with crosshairs, or accept ChibiPoint's suggestions. It solves also the 'effectiveness' problem by providing predictable and visible traversal.

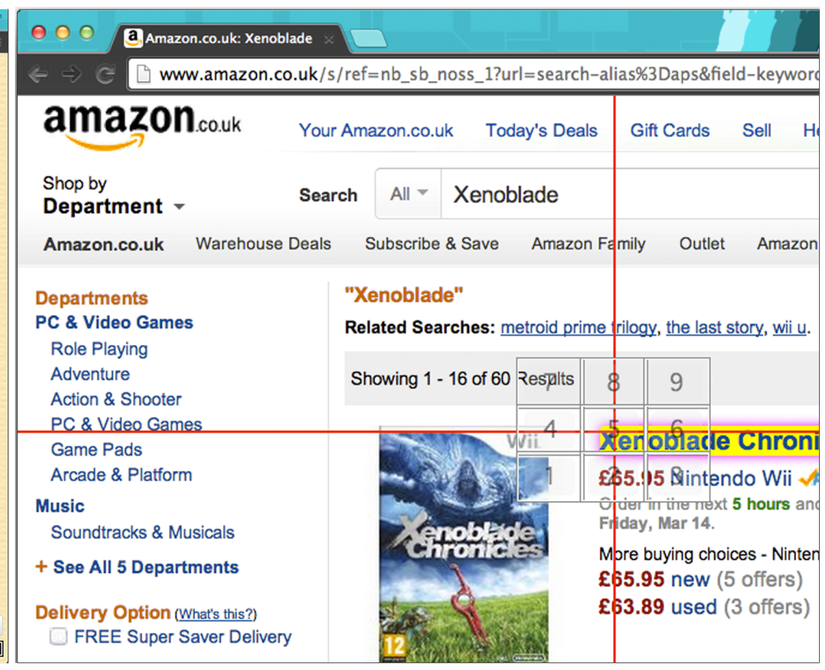
Background

Web applications have become increasingly important. We use them to send email, talk to friends, and shop online. They are optimized for pointing, and expect a mouse or touchscreen. Many users are not afforded such expressive input. People disabled by repetitive strain injuries (RSI) can be unable to use a keyboard or mouse[3]. As many as 22% of people exhibit RSI-like symptoms[4]. Additionally an 'able' user can be 'disabled' on a web browser which provides no pointing hardware (such as on Xbox or Smart TVs, which use the provided controller).

The accessible standard for browsing the web without a mouse on a desktop computer is 'tabbing' navigation[1]. This entails repeatedly pressing the 'tab' key to traverse all the elements on a webpage, linearly. Websites need to be developed to accommodate this, and even then it can be inefficient.

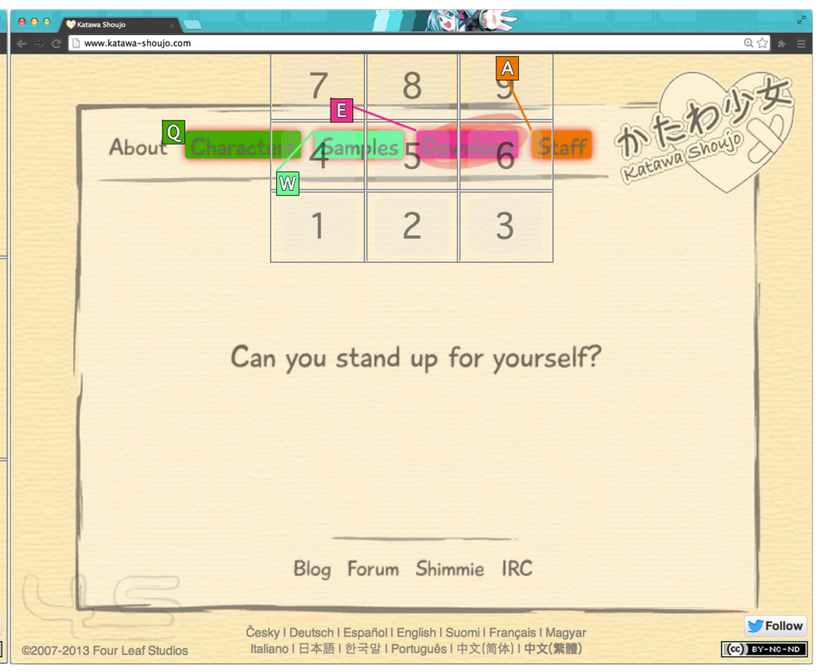
Mechanism





'Tabbing' navigation takes many keypresses to traverse to buttons that are distant in markup. Focus indication is not guaranteed.

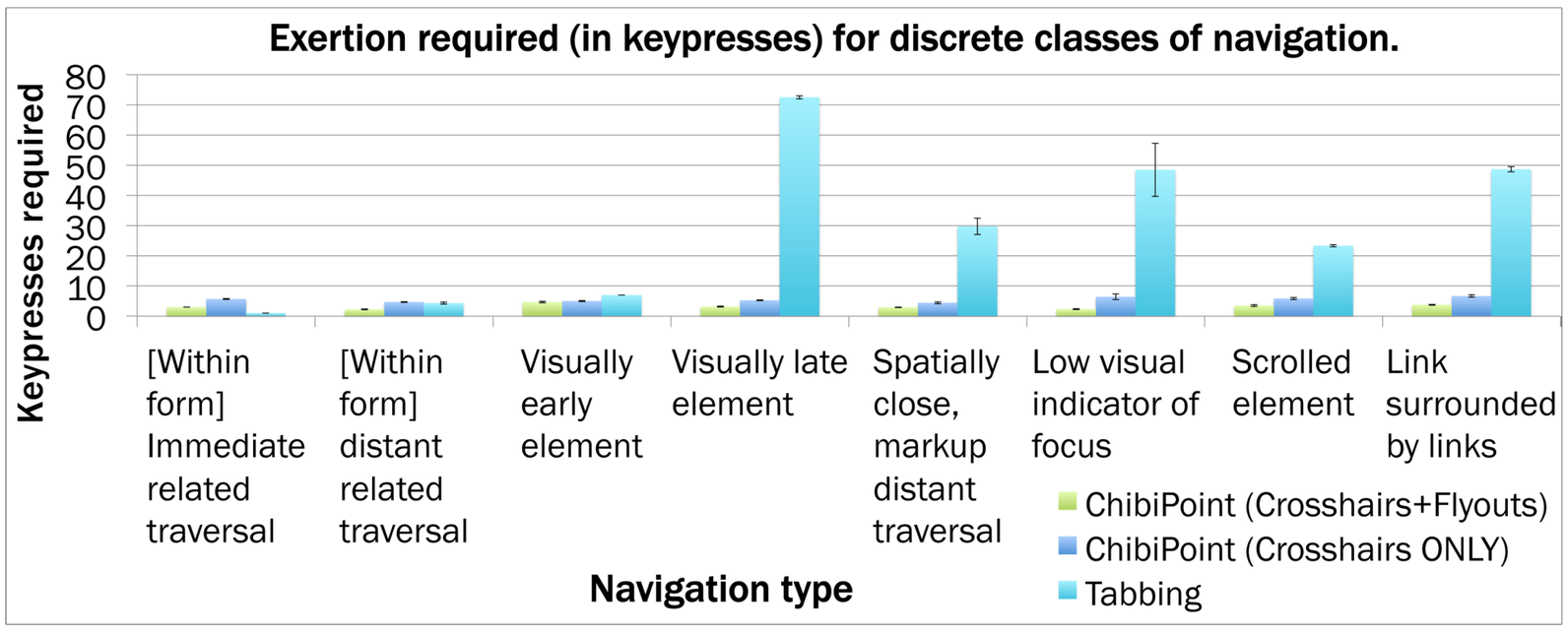
ChibiPoint's 'crosshairs' method allows users to aim at a button by 'drilling down' spatially towards it (drilling is shown below).



ChibiPoint's 'flyouts' method assigns hotkeys to clickables the user might be interested in. We show also the 'drilling' mechanism ChibiPoint uses to refine the search space in $\log_9$ time.

Evaluation

A counterbalanced 12-participant experiment compared tabbing to two modes of ChibiPoint. Both modes excelled in distant traversals, and were comparable to tabbing for near-traversal.



Conclusions

Results show that both modes of ChibiPoint offer more efficient navigation than tabbing. Flyouts improved efficiency further still. Participants unanimously preferred ChibiPoint (*graph not shown*). ChibiPoint successfully adds expressiveness and efficiency to navigation via key sequence. Further work could extend this system to non-keyboard input, to support more devices or disabilities.

References

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4. Eliana M Lacerda et al. "Prevalence and associations of symptoms of upper extremities, repetitive strain injuries (RSI) and 'RSI-like condition'. A cross sectional study of bank workers in Northeast Brazil". In: *BMC Public Health* 5.1 (2005), p. 107.