VisualBib$^{(va)}$: A Visual Analytics Platform for Authoring and Reviewing Bibliographies

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Abstract

Researchers are daily engaged in bibliographic tasks concerning literature search and review, both in the role of authors of scientific papers and when they are reviewers or evaluators. Current indexing platforms poorly support the visual exploration and comparative metadata analysis coming from subsequent searches. To address these issues, we designed and realized VisualBib$^{(va)}$, an online visual analytics solution, where a visual environment includes analysis control, bibliography exploration, automatic metadata extraction, and metrics visualization for real-time scenarios. We introduce and discuss here the relevant functions that VisualBib$^{(va)}$ supports through one usage scenarios related to the creation of a bibliography. A fully interactive environment is available at `http://visualbib.uniud.it/` *(video demo:* `http://bit.ly/3fKuZNg`*).*

CCS Concepts

• ***Human-centered computing*** → ***Visual analytics;*** • ***Information systems*** → ***Search interfaces;***

1. Introduction

The production of scientific papers is following a rising trend, particularly for scientific disciplines, with an increasing number of works for a researcher to cope with when proposing or reviewing a novel contribution. As a consequence, some bibliographic activities like the construction, refinement, evaluation, and analysis of a bibliographic corpus, are becoming key tasks in many fields [FHKM16] and researchers spend a considerable portion of their time on them. In this context, one of the main tasks to accomplish is to collect and analyze the state-of-the-art in a specific research field and contextualize the contributions to it. Moreover, different users could assign different relevance to a characteristic of a bibliography [DZCC19, ET07]: an author might be more interested in the building of a bibliography, identifying novel works to include in it, and then evaluating its properties; while a reviewer could be more focused on the properties themselves as a way of assessing its quality. Furthermore, considering that for each of the potentially citable works, there is a plethora of information and indicators that describe its quality [vEW10], managing this information can be a complex activity for a user. This poster presents a follow-up version of VisualBib$^{(va)}$ [DCA22], a real-time visual analytics platform that supports different user roles in accomplishing bibliographic tasks, ranging from the creation of a bibliography to the evaluation of bibliographic corpora of authors, making sense of their information, and helping users to improve the quality of a bibliography. It collects data from some of the major scientific indexing systems (Elsevier Scopus, OpenCitations, and CrossRef/Orcid) and supports bibliographic analysis, construction and exploration, providing details, metadata and metrics on papers and authors, and advanced visual modalities for interacting with the system. Full details about the VisualBib$^{(va)}$ design, implementation and evaluation are available in [DCA22].

2. The VisualBib$^{(va)}$ system

VisualBib$^{(va)}$ is a single-page Web application, based on W3C standard languages such as HTML5, CSS3, SVG, Javascript ES6; it adopts the D3.js [BOH11] library for data visualization and visual elements management. It implements the 24 system requirements that we collected in the taxonomy of Figure 2: on the left, we show the typical tasks of an author, while on the right are those of reviewers; in the center, the system requirements needed to support the user in those tasks.

An overview of the whole environment can be seen in Figure 1, composed of five main coordinated panels:

SGCP - Sources & General Commands Panel, mainly dedicated to importing citation indexes and management of the created bibliography at the different stages.

BEE - Bibliographic Exploration Environment, the visual core of VisualBib$^{(va)}$ (Figure 1-center), characterized by a visual representation of a bibliography called narrative view. It mainly satisfies the requirements of visualization and exploration of a bibliography.

ACE - Analysis Control Panel, the analytical core of VisualBib$^{(va)}$. It mainly supports analysis and comparison among

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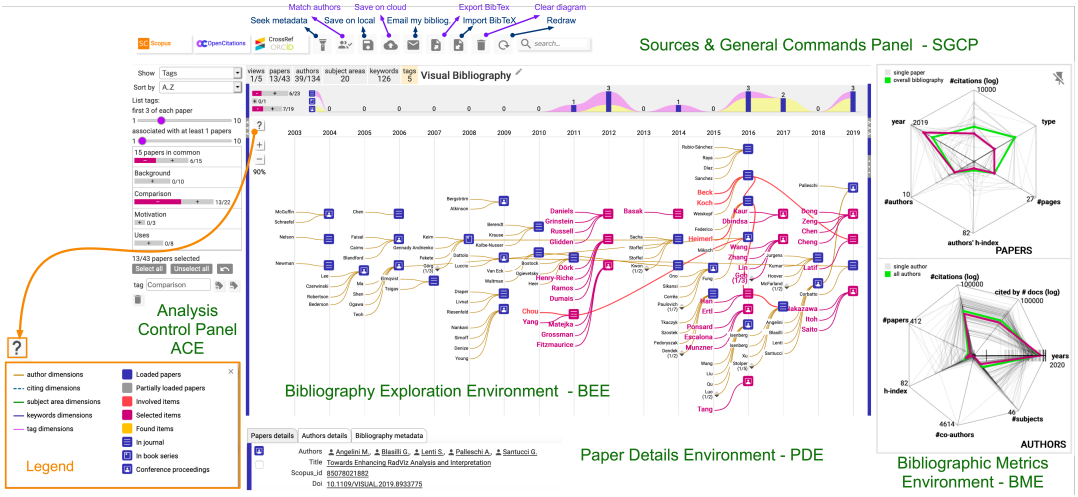

Figure 1: *An overview of the VisualBib(va) with its five panels labeled in green.*

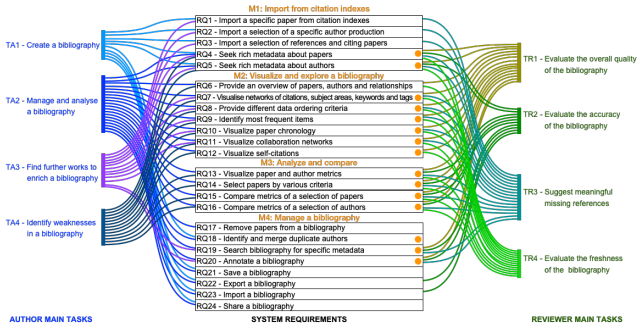

Figure 2: *A Sankey diagram summarizing the taxonomy of tasks, roles, and system requirements.*

papers and bibliographies and provides visual means for their execution and judgment. The ACE enables users to apply ordering criteria on authors, papers, subject areas, keywords, tags, and select specific (or sets of) papers.

BME -Bibliographic Metrics Environment, consisting of two radar charts [VM77, DLR09], allows for analyzing data about the academic careers of authors and their research outputs, projected on the bibliography under examination.

PDE -Paper Details Environment, listing in three different panels (Paper details, Authors details, Bibliography metadata) all the extracted, analyzed or created (meta)data. Given the vast amount of textual information available (e.g., abstracts, paper descriptions) it is organized as a list of expansible contents.

3. Usage scenario

The usage scenario concerns the task of creating the bibliography of the paper by Dattolo et al. referenced in this poster, through VisualBib(va), and concerns the creation of a bibliography about visual analytic systems supporting literature reviews creation and management. The result of this process can be seen in Figure 1. The analysis started from three seed papers: [FHKM16], [HHKE16], and [BKW16]. We proceeded by importing their cited and citing papers into the VisualBib(va) environment and collecting a set of candidates to be included. These actions were conducted by evaluating the fitness of each paper for the topic, considering subject areas and keywords, evaluating the contribution that each publication provided in the ACE, and comparing each paper's metrics to the ones of the overall bibliography in the BME. If after this analysis the paper was deemed suitable, it was tagged according to the taxonomy of classes - Background, Motivation, Uses, Extention, Comparison or Contrast, Future - [JKH*18] to make the rationale of the paper explicit in the context of our bibliography. The tags were applied using the corresponding ACE feature.

The import functions allow users to identify the already selected papers and generate a convergent process toward a finite number of papers to evaluate. The exploration of the cited and citing papers was performed using both the BEE (clicking on the four-arrow icon of each paper) and SGCP.

Using the BEE, we notice that [BKW16] and [HHKE16] mutually cite themselves and the three seed papers share 12 cited and citing papers: six contained in the cited papers and the remaining in the citing ones; in the ACE we tagged these papers (plus the three seed papers) as '15 papers in common', [BKW16] as 'Background', [HHKE16] as 'Comparison', and [FHKM16] as 'Motivation'. Then, in the PDE, we annotated some of these papers as 'work in progress'. Starting from 12 co-cited papers and three seeds (15 papers), in the ACE we identified six keywords relevant for the number of occurrences ('Information Visualization', 'Visualization', 'Citation networks', 'Literature reviews', 'Scientific literature', and 'Interactive visualizations') which we used as a basis to add new papers. Then, in the BME, we compared the features of this selection of 15 papers to the other cited and citing papers, and we extracted new candidates comparing the overall bibliography to the current selection. So we added, for example, survey [vEW10], selected by numbers of citations greater than 1000.

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