

# A Mathematical Formula for the Search Engine Ranking Efficiency Evaluation Tool S.E.R.E.E.T

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*Abstract*- The rapid developments in the field of internet search engines underline the need for reliable method to evaluate its performance. So far, the vast majority of researchers have relied on the "precision" and "recall" measures known from the field of Information Retrieval. Unfortunately, both of them fail to assess how successfully they rank the returned documents according to their relevance. In this paper, we discuss this issue in some detail, and then propose a new mechanism for the evaluation of the quality of search-engine rankings.

***Index Terms*—SEREET, Search Engine Ranking, Information Retrieval Evaluation**

## I. INTRODUCTION

THE Internet revolution gave rise to the search engine, the only tool capable of identifying among the billions of web sites those that are relevant to the user's needs. Starting from mid 1990s, hundreds of companies specializing on these tools have appeared. Many of them have gone out of business; others have merged, and yet others have joined this thriving market only recently, seeking either to outperform their predecessors, or to fit previously unexplored niches.

The principle of this tool is simple. Upon the entry of user's query, the search engine analyzes its repository of stored web sites and returns a list of relevant hyperlinks ordered by the relevance of the web sites to what the user needs. Many mechanisms to assess this relevance have been exploited, among them keyword frequency, page usage, link analysis, and various combinations of these three. Each of the multitude of alternative ranking algorithms leads to a different hyperlink ordering. Hence it becomes necessary to determine as to which of these algorithms yields the best results in terms of offering the most realistic set of hyperlinks to an average user query.

A two-pronged strategy is necessary if the question is to be answered in a satisfactory manner. First, we need appropriate experimental procedures that submit to the machine well-selected testing queries to which the relevant answers are known. Second, we need performance criteria to evaluate the quality of the search engine responses to the testing queries.

In this paper, we focus on the latter aspect. As discussed in the next section, the previous research has predominantly used the current classical performance metrics of precision and recall that are commonly used in the field of Information Retrieval. However, the utility of these metrics for search engine evaluation is limited: precision and recall establish whether the returned list contains the predominantly relevant links, and how many relevant links are missing. What they ignore is whether more relevant links find themselves high up in the list.

We begin by an extensive survey of related work in Section 2. Section 3 addresses our method accompanied by examples and comparison with existing algorithms. In section 4, we present the discussion and conclusions of our work.

## II. RELATED STUDIES

Precision and Recall is the most widely used tool to evaluate an information retrieval system. It is used by scientists to evaluate retrieval information systems. Zhang and Dong [8] present a review of many ranking algorithms and discuss the deficiencies in the existing techniques. The authors propose an algorithm with a multidimensional technique and claim an improvement in the ranking result. Their algorithm produces more relevant documents and better precision. Shafi and Rather [20] use Precision and Recall to evaluate the performance of five different search engines. Chu and Rosenthal [11] present the same evaluation criteria for retrieval performance as