NEW PRIORITY CALCULATIONS

Abstract

There are many methods of deriving priority vectors from pairwise comparison matrices, e.g. the standard largest eigenvector, the geometric mean, Harker's method, the least squares method, etc. Through our work on the SimpleAHP web application, we discovered an issue with most of these methods, that confused our users. The issue arises when there are two or more voters on a particular pairwise set, and those users have opposite votes on everything (we call them doppleganger voters). Given doppleganger voters one would expect the resulting priority sets to be inverses, or at least have reversed rankings. This is not always the case (this result has long been known, but the SimpleAHP web application made this idea more apparent).

While the geometric mean method does address this issue, it has its own shortcomings. Therefore in this paper we describe two new priority vector calculations that address doppleganger voters, while retaining the graph theoretic spirit of the eigenvector method. We compare and contrast the results of the priority calculations with some of the standard methods (eigenvector and geoemtric mean) on some differentiating examples. In addition we provide open source implementations of the new calculations in several languages (Python, R, Excel) in a free available github repository.

1 Introduction

2 Literature Review

3 Hypotheses/Objectives

4 Research Design/Methodology

5 Data/Model Analysis

6 Limitations

7 Conclusions

8 Key References

9 Appendix 1

One ring to rule them all
One ring to find them
One ring to bring them all
And in the darkness bind them