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Derivation of Consistent Pairwise Matrices

A Thesis Presented to

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Masters of Science

by

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Abstract

Derivation of Consistent Pairwise Matrices

by Chris Kuske

This thesis will give an overview of pairwise matrices and their properties. After this introduction, a summary of existing literature on Pairwise Matrices will follow.

A method of generating a consistent Pairwise Matrix from an inconsistent matrix will be presented, along with a method to find a consistent matrix that is as close to the original inconsistent matrix as possible using a calculated distance. After this methodology has been described, an analysis of the results and further work to be done will follow.

Contents

1. Introduction

Stuff

1.1. Notation and Terminology. Consistency:

Matrix:

Pairwise Matrix: A Pairwise Matrix is defined as a square matrix

Reciprocal:

2. Literature Review

Saaty

3. Methodology

3.1. Formation of Consistent Matrix.

3.2. Example.

3.3. Distance Calculation.

If M is consistent, any row or column of M may be selected such that:

$[w_1, w_2, ..., w_n] = [a_{11},\ a_{21},\ a_{31},\ ...,\ a_n 1]$

By consistency of M, it is also true that $a_{1n} = a_{1i} * a_{in}$

$a'_{in} := \frac{w_i}{w_n}$

which when further decomposed, the following holds true:

$\frac{w_i}{w_n} = \frac{a_{1i}}{a_{ni}}$ which is in turn is equivalent to $\frac{\frac{a_{1n}}{a_{in}}}{a_{ni}}$

$\frac{a_{1n}}{a_{in}*ani} = 1$

which reduces to simply a_{1n} since $\frac{a_{1n}}{1} = 1$

$a_{in} * a_{ni}$ is always 1 via the properties of pairwise matrices.

Let M' to be the $M' < W >$ where $\|M - W\|$ is smallest.

4. Results

Consider addressing what the next person to work in this area might tackle.

5. Conclusion

Here is more stuff.

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