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# Derivation of Consistent Pairwise Matrices

A Thesis Presented to

The Faculty of the Computer Science Program

California State University Channel Islands

In (Partial) Fulfillment of the Requirements for the Degree Masters of Science

by

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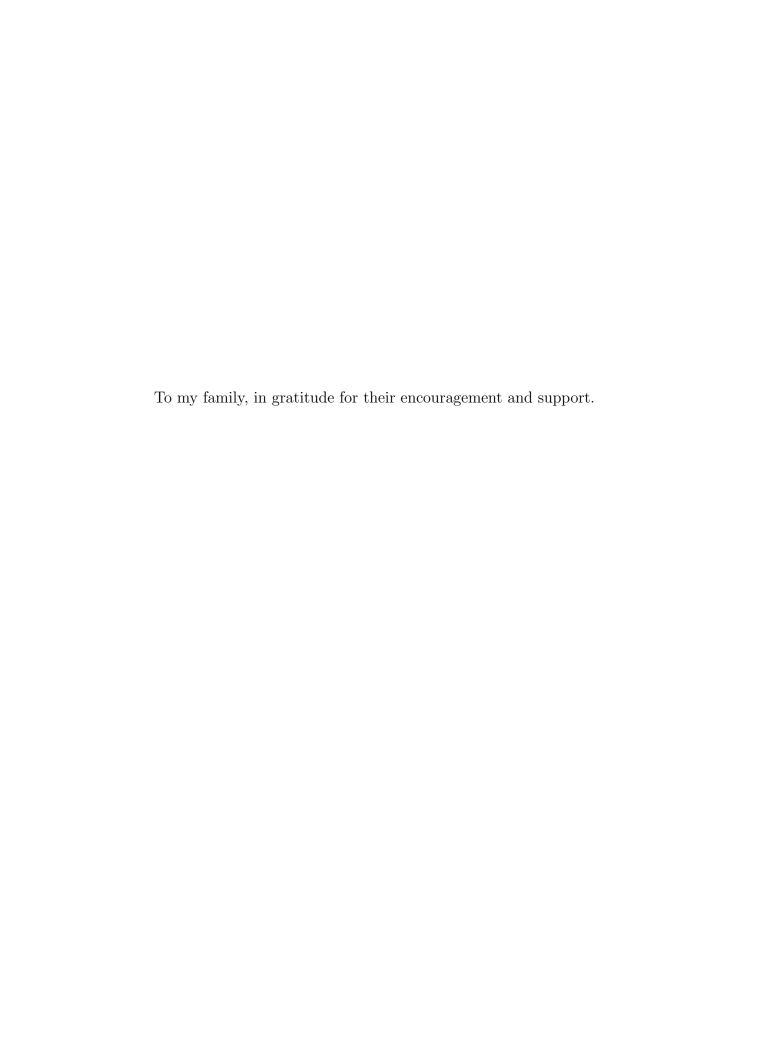
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#### Abstract

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.

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#### 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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