MS-E2191 Presentation 4
Homework model solution
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Task 1: Come up with a simple decision making problem where you are faced with interacting attributes. Solve the situation by converting them into a single multidimensional attribute.

Let us consider a case of buying a house and assessing the options through two selection criteria: square footage and condition. These two criteria are clearly interacting and we cannot value them separately.

To deal with this, we will construct a single multidimensional attribute from the two.

First we divide each of the criteria into bins and combine then into a two dimensional binning. Then we assign labels to each bin in an ascending order.

For example like this:

	Square footage			
Condition	<= 40	> 40 and >= 60	> 60 and >= 80	> 80
Inhabitable	Label 1	Label 2	Label 3	Label 4
Poor	Label 5	Label 6	Label 7	Label 8
Descent	Label 9	Label 10	Label 11	Label 12
Great	Label 13	Label 14	Label 15	Label 16

After the binning and labeling we need to assign a corresponding value to each of the bins. This happens in two passes:

First, the adjacent cells are compared to each other in absolute terms. This pass creates a holistic overview of the values. During the second pass cells (not just adjacent cells) are compared in relative terms. After a systematic comparison we end up with consistent values for each bin.

The end point could look like this:

	Square footage			
Condition	<= 40	> 40 and >= 60	> 60 and >= 80	> 80
Inhabitable	0	0	0	0
Poor	1	1.2	1.4	1.6
Descent	1.4	1.8	2.2	2.6
Great	2.3	2.8	3.3	3.8

Task 2: Describe shortly the steps one needs to make while forming a Swing Weight Matrix. Explain concisely why the Swing Weight Matrix is highly explainable?

The forming of the swing weight matrix consists of four steps:

In step 1 one needs to define the importance and variance dimensions of which the selection criteria are assessed.

In step 2 one needs to place the selection criteria into the matrix according to the two axis´ and relativeness to the other selection criteria.

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In step 3 one needs to assess the weights for each selection criteria. Weights are assigned in a way that criteria of high importance and high variation get the largest weights. And conversely, criteria of low importance and low variation get low weights.

And finally in step 4 the weights are normalized.

The swing weight matrix is highly explainable due to 4 reasons:

Frist, it explicitly defines the importance. Second, it also explicitly defines the variation of measure. Third, it provides a framework for consistent swing weight assessment. And fourth, it provides a simple and effective way to communicate the weighting decisions.

Ewing et. al. (2006) Use of Decision Analysis in the Army Base Realignment and Closure (BRAC) 2005 Military Value Analysis