Analysing Construction Cost Estimation Factors as a Map

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Overview

- Introduction
- Research Question
- Project Factors
- Creation of the 2D spatialized map
- Construction of the Topographic Map
- Production of the Consistency Map
- Conclusion
Introduction

How much does it cost to build a house?

The cost estimation process is usually performed based on parameters such as *project size*, *type of project*, *material costs*, *duration*, and *ground conditions*. 
Research Question

How the relationship between these parameters are modelled?
The aim of the proposed model is to compare these two lists in terms of the construction factors and identify the best cost estimation plan.

<table>
<thead>
<tr>
<th>Project stage</th>
<th>Completion week</th>
<th>Duration</th>
<th>Difficulty</th>
<th>Cost A</th>
<th>Cost B</th>
<th>Predecessor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clearing of the site</td>
<td>Week 2</td>
<td>2 weeks</td>
<td>2</td>
<td>5%</td>
<td>6%</td>
<td>………</td>
</tr>
<tr>
<td>Base stage</td>
<td>Week 8</td>
<td>6 weeks</td>
<td>3</td>
<td>15%</td>
<td>13%</td>
<td>Activity 1</td>
</tr>
<tr>
<td>Frame stage</td>
<td>Week 15</td>
<td>7 weeks</td>
<td>4</td>
<td>20%</td>
<td>23%</td>
<td>Activity 2</td>
</tr>
<tr>
<td>Lockup stage</td>
<td>Week 18</td>
<td>4 weeks</td>
<td>4</td>
<td>20%</td>
<td>22%</td>
<td>Activity 3</td>
</tr>
<tr>
<td>Fixing stage</td>
<td>Week 22</td>
<td>6 weeks</td>
<td>5</td>
<td>30%</td>
<td>27%</td>
<td>Activity 4</td>
</tr>
<tr>
<td>Practical completion stage</td>
<td>Week 24</td>
<td>2 weeks</td>
<td>3</td>
<td>10%</td>
<td>9%</td>
<td>Activity 5</td>
</tr>
</tbody>
</table>
Creation of the 2D Spatialized Map

\[ d_{sp} = \frac{1}{TD} \sqrt{(x_n - x_p)^2 + (y_n - y_p)^2}, \]
Construction of the Topographic Map

\[
\text{Sigmoid} \left( d_{SP} \right) = \left( \frac{1}{1 + e^{-\text{norm}(d_{SP})}} \right) \times C_n
\]
Construction of the Topographic Map

$3D \text{ view of the Cost } A$

Sigmoid $(d_{Sp}) = \left( \frac{1}{1+e^{-\text{norm}(d_{Sp})}} \right) \times C_n$
Production of the Consistency Map

3D view of the Cost A

3D view of difficulty map

3D view of the Cost B

The consistency map for Cost A

The consistency map for Cost B
Conclusion

This paper highlights a new method that allows us to map the relationship between different non-spatial factors in the cost estimation model. The results demonstrate the high potential of the proposed method to estimate the cost for a house-construction project.
References


