

A Case Based Approach to Concrete Deterioration Assessment

José Neves*[✉], Guida Gomes*, José Machado* and Henrique Vicente[†]

* Centro Algoritmi, Universidade do Minho, Braga, Portugal
{jneves, jmac}@di.uminho.pt; mguida.mgomes@gmail.com

[†] Departamento de Química, Centro de Química de Évora, Escola de Ciências e Tecnologia,
Universidade de Évora, Évora, Portugal
hvicente@uevora.pt

[✉] Corresponding author: phone: +351-934201337; fax: +351-253604471; e-mail:
jneves@di.uminho.pt

Abstract

The deterioration of concrete infrastructures is of concern since maintenance and repair require large amounts of resources. It is a multifaceted and complex phenomenon, with multiple causes, namely age, use, maintenance, type of environmental exposure and aggression by biological, chemical, mechanical and physical agents. However, it may be prevented if proactive strategies were embraced (e.g., taking into account similar past experiences). Indeed, this work will start with the development of a decision support system to prevent these events from happening, centered on a formal framework based on Logic Programming for knowledge representation, complemented with a Case-Based Reasoning (CBR) approach to problem solving, which caters for the handling of incomplete, unknown, or even contradictory information. The CBR cycle was adapted in order to cater for the developments referred to above, and clustering methods were enforced to distinguish and aggregate collections of historical records in order to reduce the search space and enhance the retrieve phase.

Keywords: Case Based Reasoning; Normalization; Logic Programming; Knowledge Representation and Reasoning; Similarity Analysis; Concrete Deterioration.