DESIGN OF NORMAL CONCRETE MIXES USING NEURAL NETWORK MODEL

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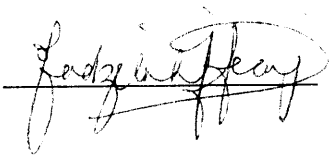
(Signature) : 

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ABSTRAK (BAHASA MALAYSIA)

Faktor terpenting dalam menentukan kualiti konkrit ialah kekuatannya. Untuk mencapai kekuatan yang dikehendaki, nisbah bahan-bahan dalam konkrit seperti air, simen, pasir dan batu baur hendaklah dikenalpasti. Kaedah rekabentuk campuran yang ada pada masa kini seperti kaedah ACI dan DoE yang melibatkan banyak pengiraan, carta rekabentuk dan jadual adalah rumit serta panjang. Tujuan projek ini adalah untuk membina satu kaedah rekabentuk campuran konkrit lebih mudah dan umum dengan mengunakan teknik rangkaian neural. Tatacara untuk membina model rangkaian neural menggunakan rangkaian perambatan balik dan beberapa isu berkaitan dengan penyediaan data, dibincangkan bagi membantu pembangunan aplikasi yang berkesan. Dapatan projek ini menunjukkan bahawa aplikasi rangkaian neural mampu menyediakan penyelesaian kepada masalah kejuruteraan awam, terutamanya dalam merekabentuk campuran konkrit .

ABSTRACT

The most important factor in determining the quality of concrete is its strength. In order to achieve the required strength, a right proportion of materials in concrete such as water, cement, sand and course aggregate, need to be identified. The present mix design methods such as ACI and DoE methods, which involve numerous calculations, design charts and table look-up are seem to be tedious and lengthy. The purpose of this project is to develop a simpler and generalized concrete mix design method using neural network techniques. A procedure for developing neural network models using back propagation networks is presented, and a number of issues related to data preparation are described to facilitate the development of efficient application. The findings of this project show that the application of neural network is capable of providing solutions to the civil engineering problem, particularly in designing the concrete mixes.

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INTRODUCTION

Concrete becomes a material that literally forms the basis of our modern society and until today, concrete is the most widely used man-made construction materials. Most of all buildings, drains, dams, piles and bridges are made of concrete, including some portions of highways. Concrete structures are everywhere. Concrete offers a lot of advantages such as the ability to cast, economical, durable, fire resistant, on-site fabrication and aesthetic properties (Sidney and Young, 1981).

Due to lots of usage and its importance especially in civil and construction engineering, there are needs to fully utilize or optimize the capabilities of the concrete. As higher and higher performance is sought from concrete, obtaining the proper mixture proportion to achieve specific objectives is becoming more difficult (Simon, *et al.*, 1999). It has to be designed with the correct mixture in such a way that it can perform to the required strength, durability, workability, safety, economics and other specified elements. Durability is the ability of concrete to withstand the conditions for which it has been designed, without deterioration over a period of years. Meanwhile, the workability is the ability of concrete to compact and easy to work with.

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