

Classifying compressive strength of clay bricks using an inertial projected forward-backward algorithm

WATCHARAPORN CHOLAMJIAK¹, SIWAT LAWANWADEEKUL², KUNRADA KANKAM³,
PRASIT CHOLAMJIAK¹, AND NIPA JUN-ON⁴

ABSTRACT. The enduring popularity of clay bricks as a construction material can be attributed to their affordability. Nevertheless, the elevated temperatures necessary to attain the desired physical and mechanical characteristics result in substantial energy consumption and the emission of thermal pollutants. Accurately classifying clay bricks is essential in evaluating their suitability for construction purposes, with compressive strength being a critical parameter. The present study introduces new projected forward-backward algorithms for solving constrained convex minimization problems by using line search techniques to classify the compressive strength of clay bricks. The algorithm performs better than current methodologies, displaying exceptional precision, recall, F1 score, and accuracy.

As a numerical result, the finding highlight the significance of water absorption for classifying compressive strength. The bulk density is directly influenced by the size of additives, whereas the firing temperature, firing shrinkage, and apparent porosity exhibit interrelationships throughout the firing process. A comprehensive understanding of these parameters is pivotal in enhancing the clay brick manufacturing process and facilitates informed decision-making about material selection and structural design. Moreover, the algorithm can enhance machine learning methodologies in materials science and engineering applications.

ACKNOWLEDGMENTS

N. Jun-on and S. Lawanwadeekul would like to thank Thailand Science Research and Innovation, 2025 Fundamental Fund, Lampang Rajabhat University (Grant No. 030/2568).

K. Kankam, W. Chalamjiak and P. Chalamjiak would like to thank Thailand Science Research and Innovation, the University of Phayao (Grant No. FF68-UoE).

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Received: 26.04.2025. In revised form: 16.08.2025. Accepted: 18.11.2025

2020 *Mathematics Subject Classification.* 65K05, 90C25, 90C30, 90B30, 90B99.

Key words and phrases. *constrained convex minimization problem; machine learning; projected forward-backward algorithm; clay bricks; compressive strength; construction material classification.*

Corresponding author: Nipa Jun-on; nipa.676@g.lpru.ac.th

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¹ SCHOOL OF SCIENCE, UNIVERSITY OF PHAYAO, PHAYAO 56000, THAILAND

Email address: watcharaporn.ch@up.ac.th

Email address: prasitch2008@yahoo.com

² FACULTY OF INDUSTRIAL TECHNOLOGY, LAMPANG RAJABHAT UNIVERSITY, LAMPANG 52100, THAILAND

Email address: b_siwat@g.lpru.ac.th

³ ELEMENTARY EDUCATION PROGRAM, FACULTY OF EDUCATION, SUAN DUSIT UNIVERSITY LAMPANG CENTER, LAMPANG 52100, THAILAND

Email address: kunradazzz@gmail.com

⁴ FACULTY OF SCIENCE, LAMPANG RAJABHAT UNIVERSITY, LAMPANG 52100, THAILAND

Email address: nipa.676@g.lpru.ac.th