

Accepted Manuscript

Extending an iterative orthogonal projection method towards least-squares solutions

Noreen Jamil, Farhaan Mirza, M. Asif Naeem, Nilufar Baghaei

PII: S0377-0427(18)30104-3

DOI: <https://doi.org/10.1016/j.cam.2018.02.025>

Reference: CAM 11531

To appear in: *Journal of Computational and Applied Mathematics*

Received date: 26 March 2017

Revised date: 9 October 2017

Please cite this article as: N. Jamil, F. Mirza, M.A. Naeem, N. Baghaei, Extending an iterative orthogonal projection method towards least-squares solutions, *Journal of Computational and Applied Mathematics* (2018), <https://doi.org/10.1016/j.cam.2018.02.025>

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.



Extending an iterative orthogonal projection method towards least-squares solutions

Noreen Jamil³, Farhaan Mirza¹, M. Asif Naeem², Nilufar Baghaei³

^{1,2}*School of Engineering, Computer and Mathematical Sciences, Auckland University of Technology
Private Bag 92006, Auckland, New Zealand.*

³*Department of Computer Science
Unitec Institute of Technology.*

1. Introduction

The Kaczmarz method [1] is an iterative method for solving large systems of equations that projects iteratively orthogonally onto the solution space of each equation. In contrast to direct methods such as Gaussian elimination or QR-factorization, this algorithm is efficient for problems with sparse matrices, as encountered in constraint-based user interface (UI) layout specifications.

Starting with an initial guess, the Kaczmarz algorithm selects a row index of the matrix and projects the current iterate onto the solution space of that equation, refining the solution until a sufficient precision is reached. The Kaczmarz algorithm does not need any pivot assignment, and it is ideal for highly over-determined linear systems, as in many linear problems including the constraint-based UI layout. In our paper [2], we proposed extensions to the linear relaxation method to deal with this issue. Our analysis showed that the Kaczmarz method is more suitable for solving non-square matrices as they occur in UI layout.

Despite Kaczmarz's efficiency for sparse systems, it is seldom used for generating constraint-based UI layouts. The reasons are as follows. First, constraint-based UI layout contains linear *equality* and *inequality constraints* for specifying relationships among objects such as "inside", "above", "below", "left-of",

¹farhaan.mirza@aut.ac.nz

²mnaeem@aut.ac.nz

³nbaghaei@unitec.ac.nz, njamil@unitec.ac.nz

Download English Version:

<https://daneshyari.com/en/article/8901928>

Download Persian Version:

<https://daneshyari.com/article/8901928>

[Daneshyari.com](https://daneshyari.com)