

Abstract Book

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Double splitting preconditioner: A new class of preconditioners

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December 13, 2022 (Tuesday), 12:30 - Room 1307

We propose a splitting preconditioner generalization, where the authors present a new approach to working with the augmented system in the context of interior point methods for linear programming. It is also shown that the splitting preconditioner works very well near to a solution of the linear programming problem, a nice feature, since in such case the linear systems tend to be extremely ill-conditioned. We introduce a double preconditioner for the augmented system, including three new parameters. In this way, it allowed us a greater range of possibilities for new preconditioners, which we call Double Splitting Preconditioner. Furthermore, we show an important theorem that tells us that we have a variety of choices for some blocks that make up the double splitting preconditioner and that lead to the same linear system matrix (first block of the doubly splitting matrix) which is the main key to the efficiency of the proposed method. Through new parameters, we obtain a preconditioned matrix with eigenvalues far away to zero. Moreover, through appropriate choices of such parameters, we actually obtain a well conditioned matrix in the final iterations of the interior point method. And in a way, we have a priori knowledge concerning the matrix condition number in the final iterations. In fact, we have some control over the condition number along the whole iterative process. Therefore, the main objective of this work is to provide a preconditioner that improves the condition number of the preconditioned matrix, and possibly in this way also improves the iteration number and total time required to solve the linear programming problem. We perform numerical tests using the Matlab software, to verify the efficiency of the proposed method. In this way, we are able to verify the influence of the parameters of the double splitting preconditioner, showing that for convenient values of these parameters, there is a decrease in the number of the iterative method iterations.

Keywords: Preconditioning; Augmented system; Interior point methods; Linear programming

Colorectal cancer in Chile: a Latin-American country with marked socioeconomic inequities

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INTRODUCTION: Colorectal cancer (CRC) is the third most frequent malignant disease in the world. In some countries with established screening programs, its incidence and mortality have decreased, and survival has improved.

AIMS: To obtain reliable data about the epidemiology of CRC in Chile, we analyzed the trends in the last ten years and the influence of observable factors on survival, including explicit guarantees in CRC treatment access.

METHODS: Data were obtained from registries of mortality and hospital discharges, making follow-up of the individuals possible. Crude and age-standardized incidence and mortality rates were calculated, and individual survival was studied by constructing Kaplan–Meier curves. Finally, a Cox statistical model was established to estimate the impact of the observable factors.

RESULTS: 99,846 hospital discharges were registered between 2009 and 2018 in Chile, corresponding to 36,649 patients. In the same period, 24,154 people died of CRC. A nearly linear, steady increase in crude incidence, mortality and prevalence was observed. CRC incidence was the lowest in the North of the country, increasing toward the South and reaching a maximum value of 35.7/100,000 inhabitants/year in terms of crude incidence and 20.7/100,000 inhabitants/year in terms of crude mortality in the XII region. Kaplan–Meier survival curves showed a slight improvement during the study period. Depending on socioeconomic status, survival was significantly better with private insurance than the national insurance system. Patients in the capital city survived longer than those in other parts of the country. We found no significant effect on survival associated with the GES program.

CONCLUSIONS: The introduction of a national screening program is the only way to diminish serious inequality and improve the survival rate of CRC in Chile.