

# Strip Constrained Binary Tomography

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**Abstract:** The goal of discrete tomography(DT) [1] is to reconstruct discrete images from their projections (sets of line sums taken along parallel lines in different directions). Binary tomography is a specific area of DT when the image to reconstruct is binary. In our case, 1 stands for the object (black) and 0 stands for the background (white) pixels. Due to physical limitations, the projections can be gathered from only a few directions in practice, therefore the reconstruction problem can be highly underdetermined. During the reconstruction process, prior knowledge is often incorporated into an energy function to reduce the search space of feasible solution. Thus, the reconstruction issue is equivalent to a function minimization problem.

Motivated by nonogram puzzles, we introduce a novel prior to describe the expected texture of the reconstructed image: the number of strips in each row and column. We propose an exact deterministic and a stochastic method to solve the problem. The effectiveness of the two methods are compared on artificial data sets from different image classes.

**Keywords:** binary tomography; reconstruction; nonogram

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## References

- [1] Herman, G.T., Kuba, A. (eds.): Advances in Discrete Tomography and Its Applications. Birkhäuser, Boston (2007)