

# EXTRACTING A LARGE WELL-CONDITIONED BLOCK INSIDE A MATRIX

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Given  $U$  an  $n \times m$  matrix, the aim is to extract a large number of linearly independent columns of  $U$  and estimate the smallest and the largest singular value of the restricted matrix. For that, we give two deterministic algorithms: one for a normalized version of the restricted invertibility principle of Bourgain-Tzafriri, and one for the norm of coordinate restriction problem due to Kashin-Tzafriri. Merging the two algorithms, we are able to extract a well-conditioned block inside  $U$ , improving a previous result due to Vershynin. We give some applications of this result to the study of contact points of a convex body.