Additional Experiments T-Rex

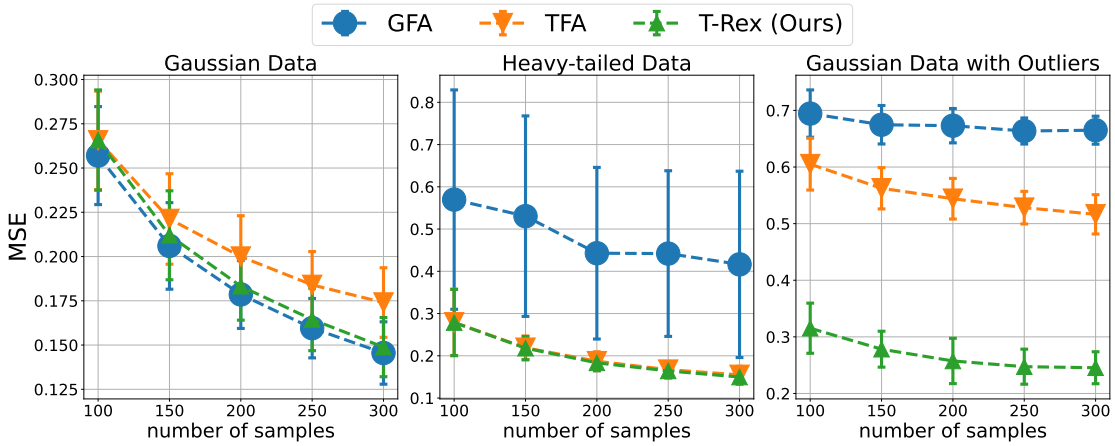

Figure 1: Additional results for `T-Rex` and the other two factor model estimators `GFA` and `TFA` (references for these estimators are given in the paper). We plot the mean-squared error (MSE) for fixed dimension $n = 50$ of the covariance matrix versus the *number of samples*. (In the paper we plotted the MSE versus the *dimension*.) For the contaminated data, we added 2% of outliers (generated the same way as in the paper). We see that `T-Rex` is more robust than the other two estimators. On Gaussian data it is comparable to `GFA` which assumes Gaussian data. On multivariate t-distributed data it is comparable to `TFA` which assumes multivariate t-distributed data.

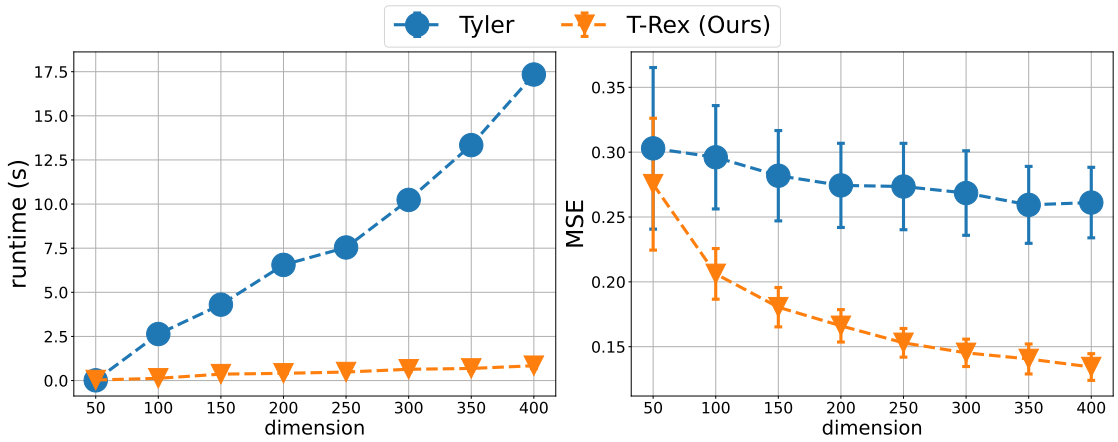

Figure 2: `T-Rex` can be viewed as extension of Tyler's M-estimator. We compare `T-Rex` and `Tyler` in terms of runtime and accuracy. In the left part of the figure we plot the runtime of `T-Rex` and `Tyler` versus the dimension n of the covariance matrix. In the right part we plot the mean-squared error (MSE) of `T-Rex` and `Tyler` versus the dimension n of the covariance matrix. The true covariance matrix was chosen to be the sample covariance matrix of daily returns of S&P 500 stocks. In other words, we did *not* plant a low-rank plus diagonal covariance structure in this experiment. We ran `T-Rex` with $r = 5$ factors, and note that the results were very similar for $r = 10$. For each n dimension n, we considered a challenging scenario with $m = n + 1$ samples, *i.e.,* the number of observations was essentially the same as the dimension. We see that `T-Rex` is both an order of magnitude faster, and also more accurate, than `Tyler`.