

Bootstrap in high dimension  
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In high-dimensional settings, classical resampling methods may fail to provide valid distributional approximations. In particular, we show that the traditional  $n$ -out-of- $n$  bootstrap can be inconsistent for statistics based on empirical covariance matrices when the dimension is comparable to or larger than the sample size. A commonly used alternative, the  $m$ -out-of- $n$  bootstrap, is often effective in low- and moderate-dimensional problems and will be reviewed in this talk. However, we demonstrate that this approach may also break down in high-dimensional regimes. To address this issue, we introduce a twofold bootstrap procedure that simultaneously resamples  $m$  observations from the original sample and  $q$  components of each observation, with the constraint  $pm = qn$ . We discuss the theoretical motivation for this approach and outline its advantages for inference in high-dimensional covariance-related problems.