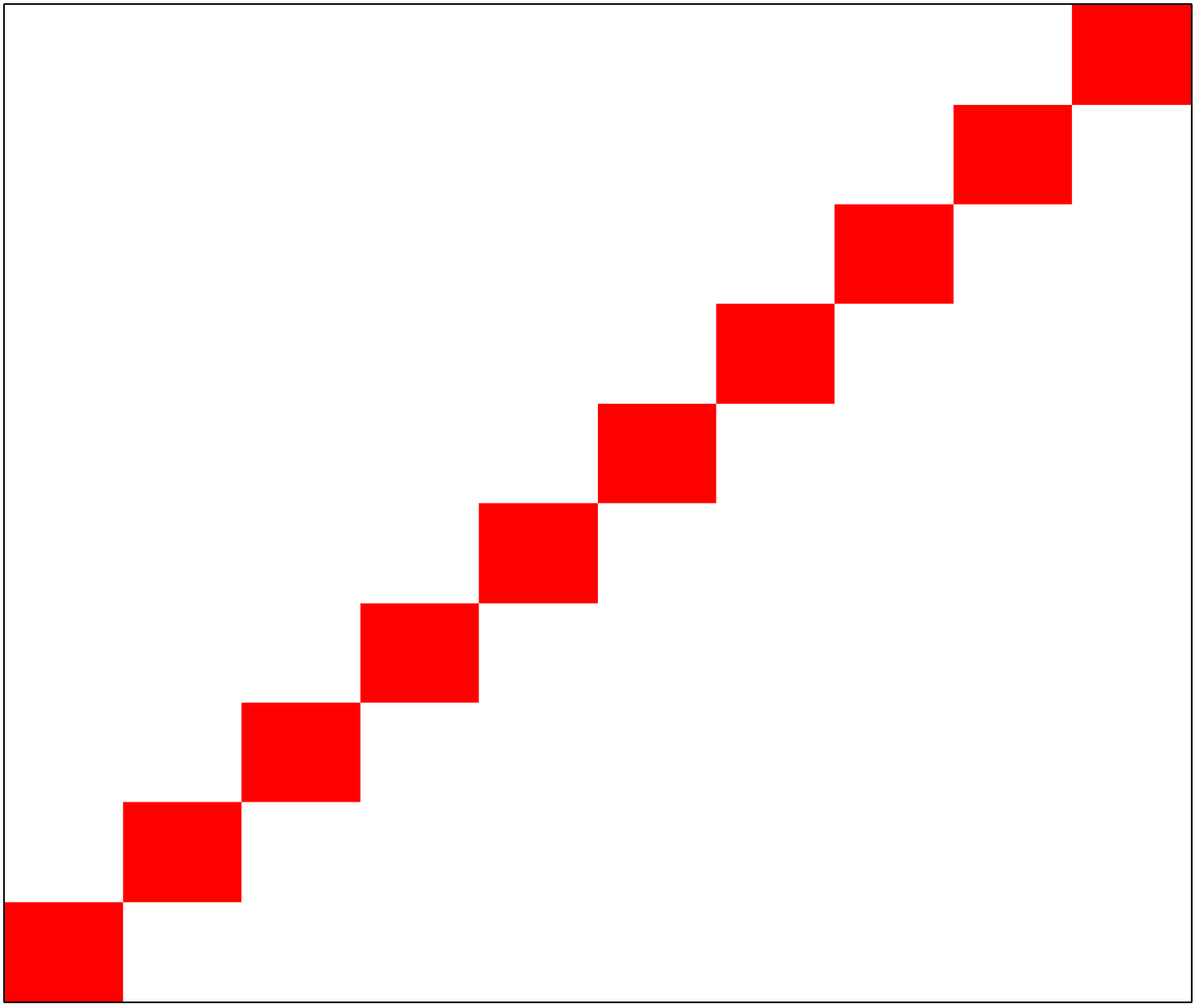pop corr matrix