Nonnegative Matrix Factorization (NMF) has been widely utilized in large scale data analytics problems. We show a fast algorithm for NMF when the reduced rank is 2, and how this fast algorithm can be combined with decision rules to generate highly scalable divide-and-conquer algorithms for clustering, topic modeling of text data, and community detection. Some substantial experimental results illustrate the utility of the divide-and-conquer NMF and our open source software, SmallK (smallk.github.io). (Received January 17, 2017)