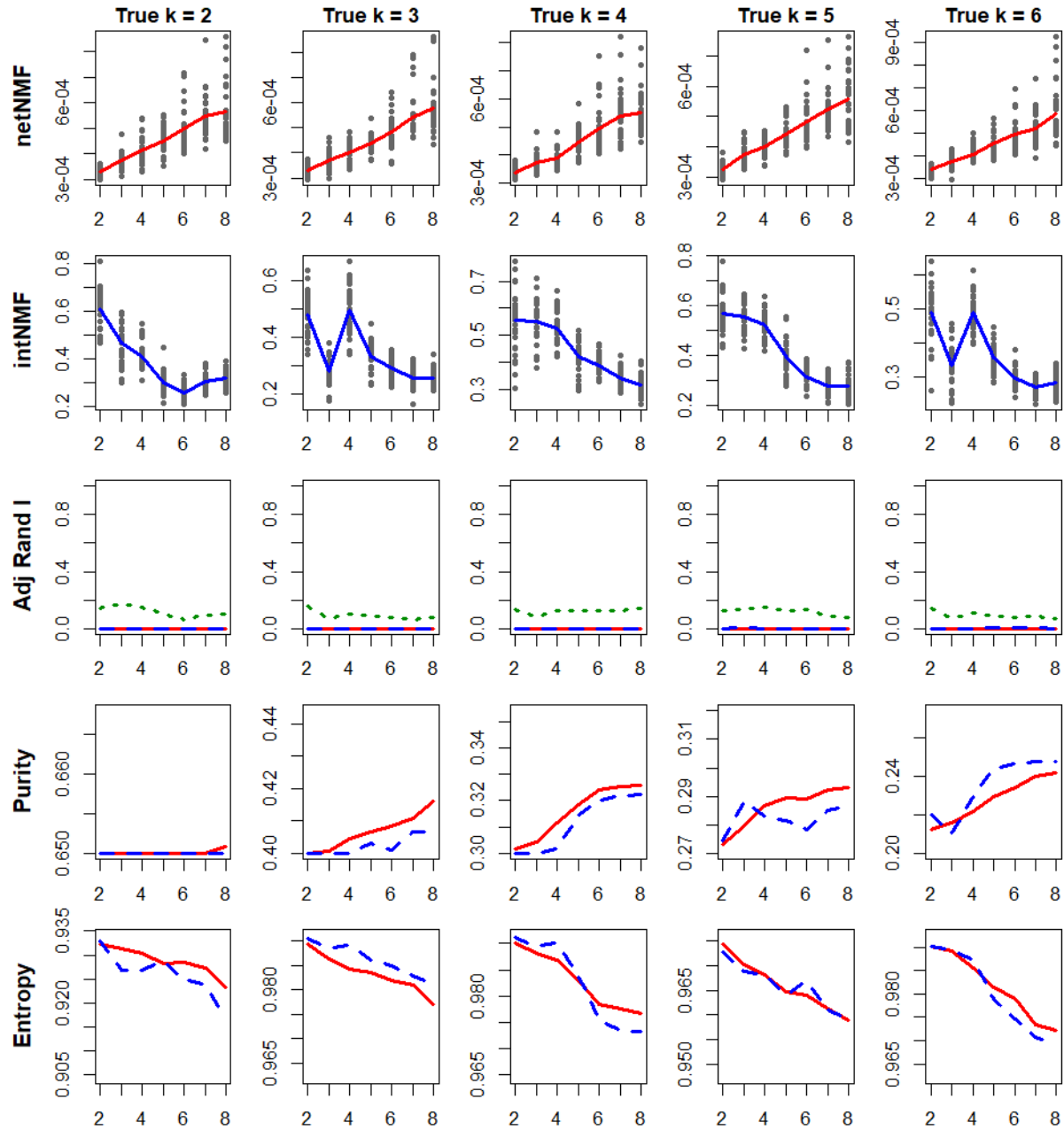# Complete set of supplementary Figures:

Fig. S1: Comparison of netNMF and intNMF over varying k and effect size = 0. First row represents the Silhouette width for netNMF, second row represents Cluster prediction Index (CPI) for intNMF method. The third row represents adjusted rand index between (i) true and netNMF-clusters (red), (ii) true and intNMF-clusters (blue) and (iii) netNMF-clusters and intNMF-clusters (green). Fourth and fifth rows represent the plot of *purity* and *entropy* for netNMF (red) and intNMF (blue).
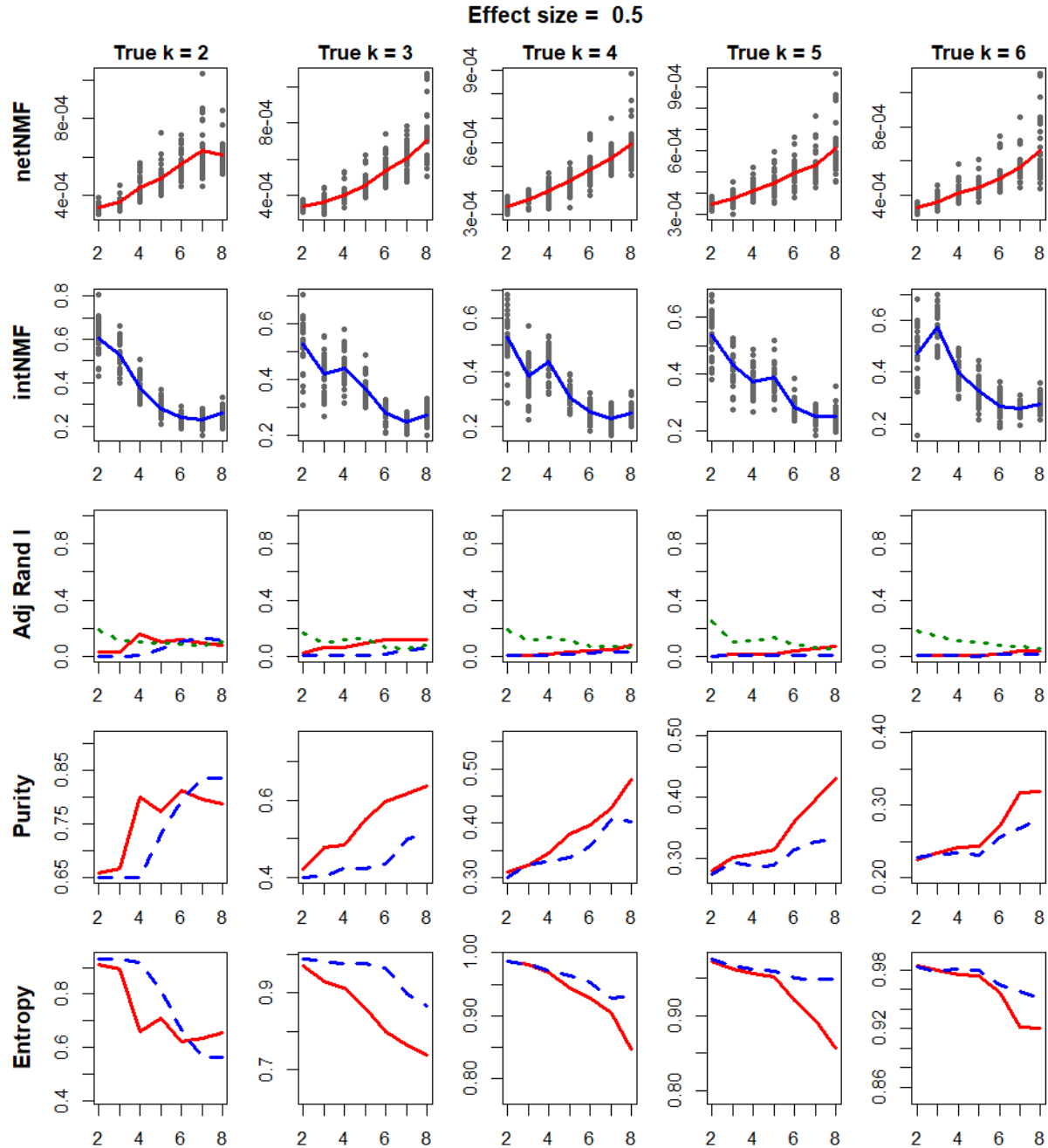
Fig. S2: Comparison of netNMF and intNMF over varying k and effect size = 0.5. First row represents the Silhouette width for netNMF, second row represents Cluster prediction Index (CPI) for intNMF method. The third row represents adjusted rand index between (i) true and netNMF-clusters (red), (ii) true and intNMF-clusters (blue) and (iii) netNMF-clusters and intNMF-clusters (green). Fourth and fifth rows represent the plot of *purity* and *entropy* for netNMF (red) and intNMF (blue).
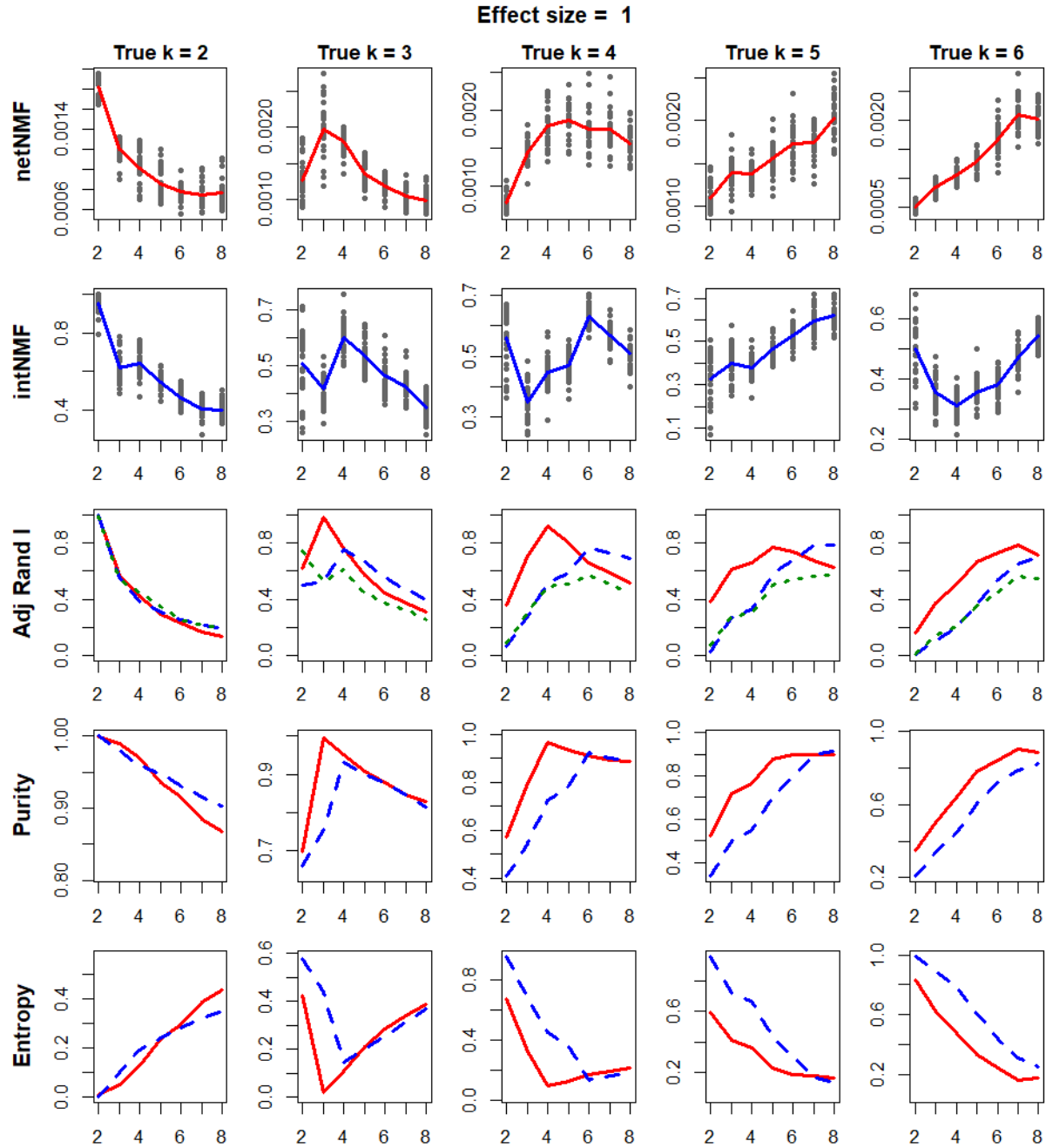
Fig. S3: Comparison of netNMF and intNMF over varying k and effect size = 1. First row represents the Silhouette width for netNMF, second row represents Cluster prediction Index (CPI) for intNMF method. The third row represents adjusted rand index between (i) true and netNMF-clusters (red), (ii) true and intNMF-clusters (blue) and (iii) netNMF-clusters and intNMF-clusters (green). Fourth and fifth rows represent the plot of *purity* and *entropy* for netNMF (red) and intNMF (blue).
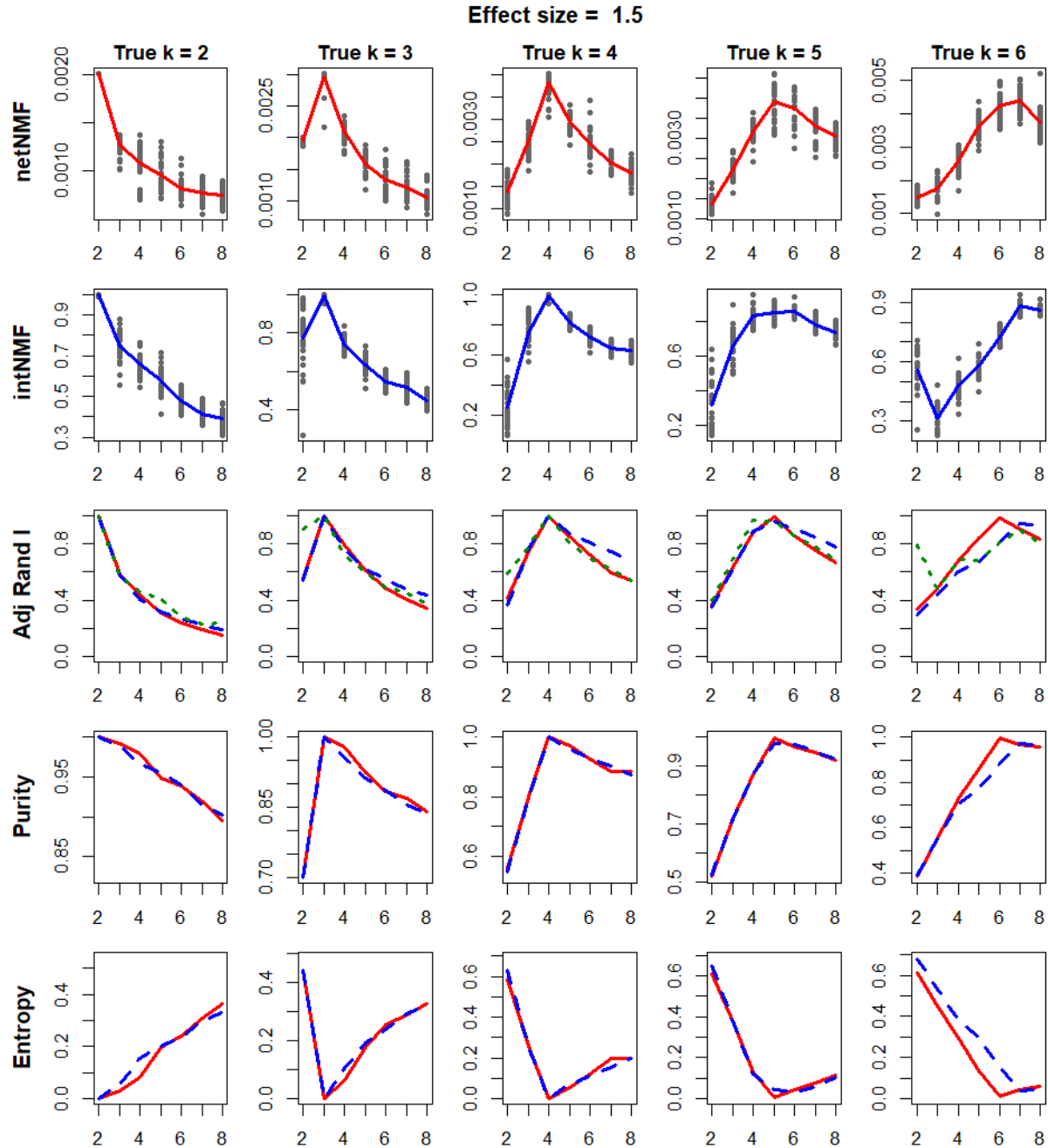
Fig. S4: Comparison of netNMF and intNMF over varying k and effect size = 1.5. First row represents the Silhouette width for netNMF, second row represents Cluster prediction Index (CPI) for intNMF method. The third row represents adjusted rand index between (i) true and netNMF-clusters (red), (ii) true and intNMF-clusters (blue) and (iii) netNMF-clusters and intNMF-clusters (green). Fourth and fifth rows represent the plot of *purity* and *entropy* for netNMF (red) and intNMF (blue).
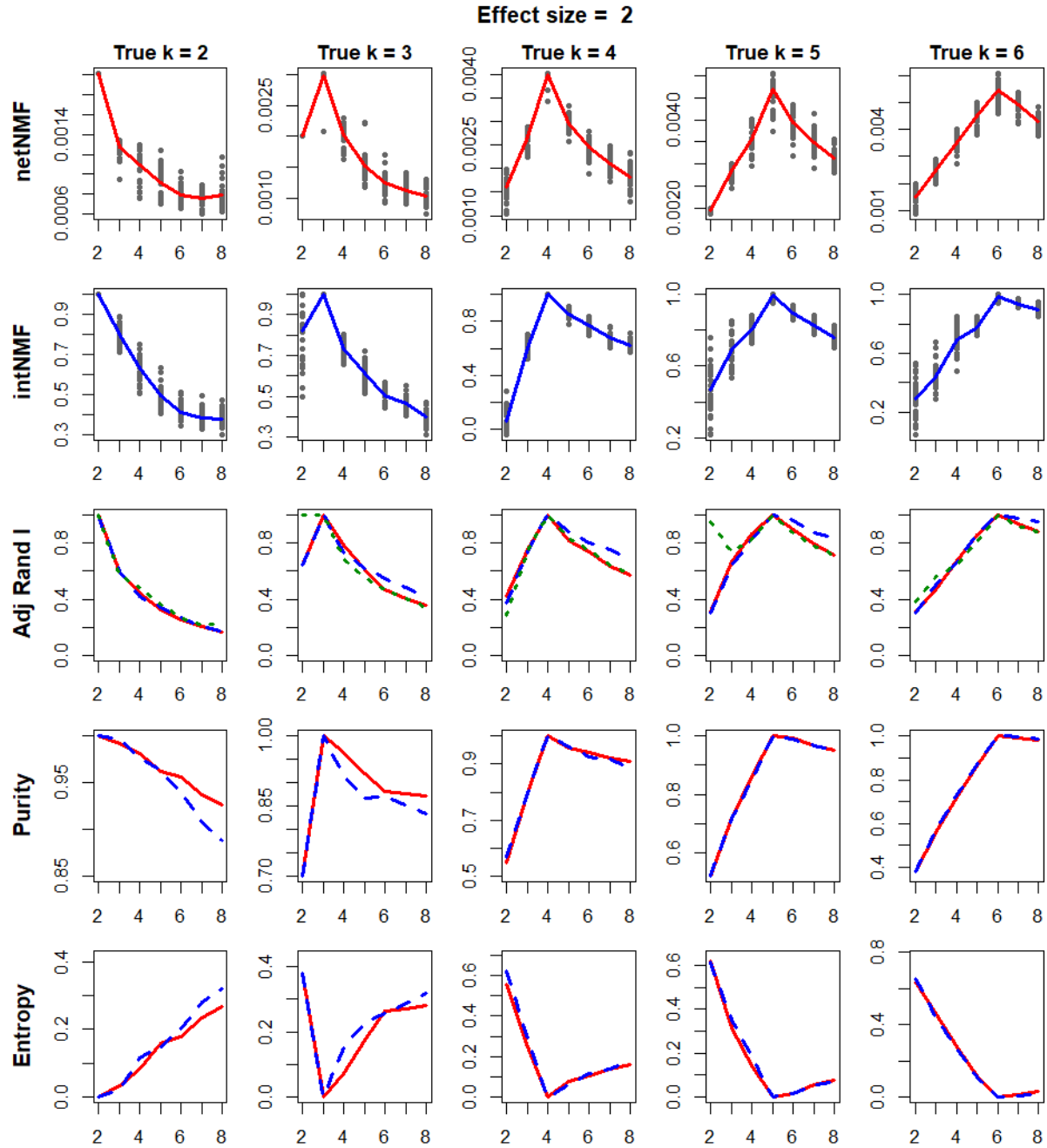
Fig. S5: Comparison of netNMF and intNMF over varying k and effect size = 2. First row represents the Silhouette width for netNMF, second row represents Cluster prediction Index (CPI) for intNMF method. The third row represents adjusted rand index between (i) true and netNMF-clusters (red), (ii) true and intNMF-clusters (blue) and (iii) netNMF-clusters and intNMF-clusters (green). Fourth and fifth rows represent the plot of *purity* and *entropy* for netNMF (red) and intNMF (blue).
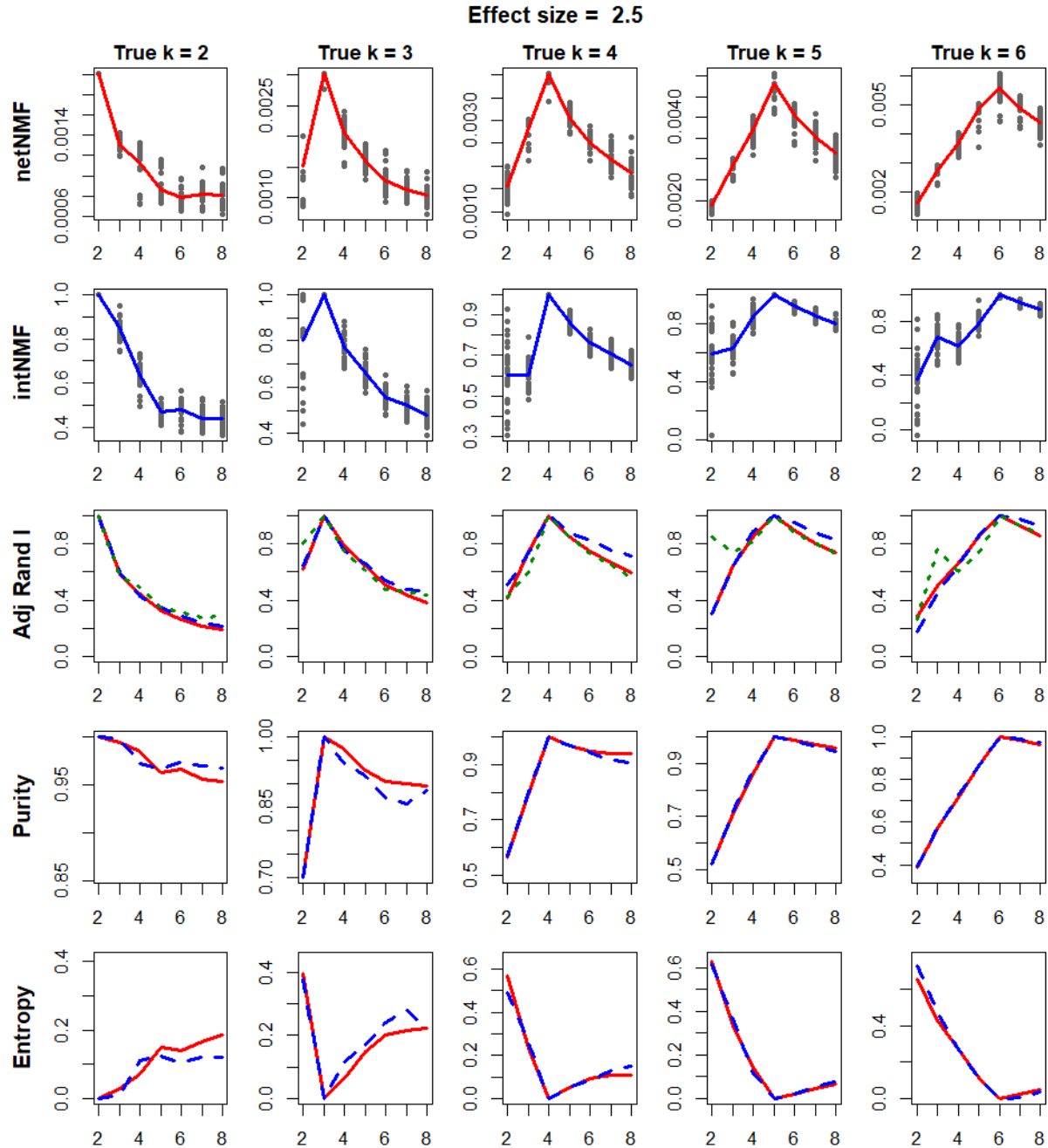
Fig. S6: Comparison of netNMF and intNMF over varying k and effect size = 2.5. First row represents the Silhouette width for netNMF, second row represents Cluster prediction Index (CPI) for intNMF method. The third row represents adjusted rand index between (i) true and netNMF-clusters (red), (ii) true and intNMF-clusters (blue) and (iii) netNMF-clusters and intNMF-clusters (green). Fourth and fifth rows represent the plot of *purity* and *entropy* for netNMF (red) and intNMF (blue).
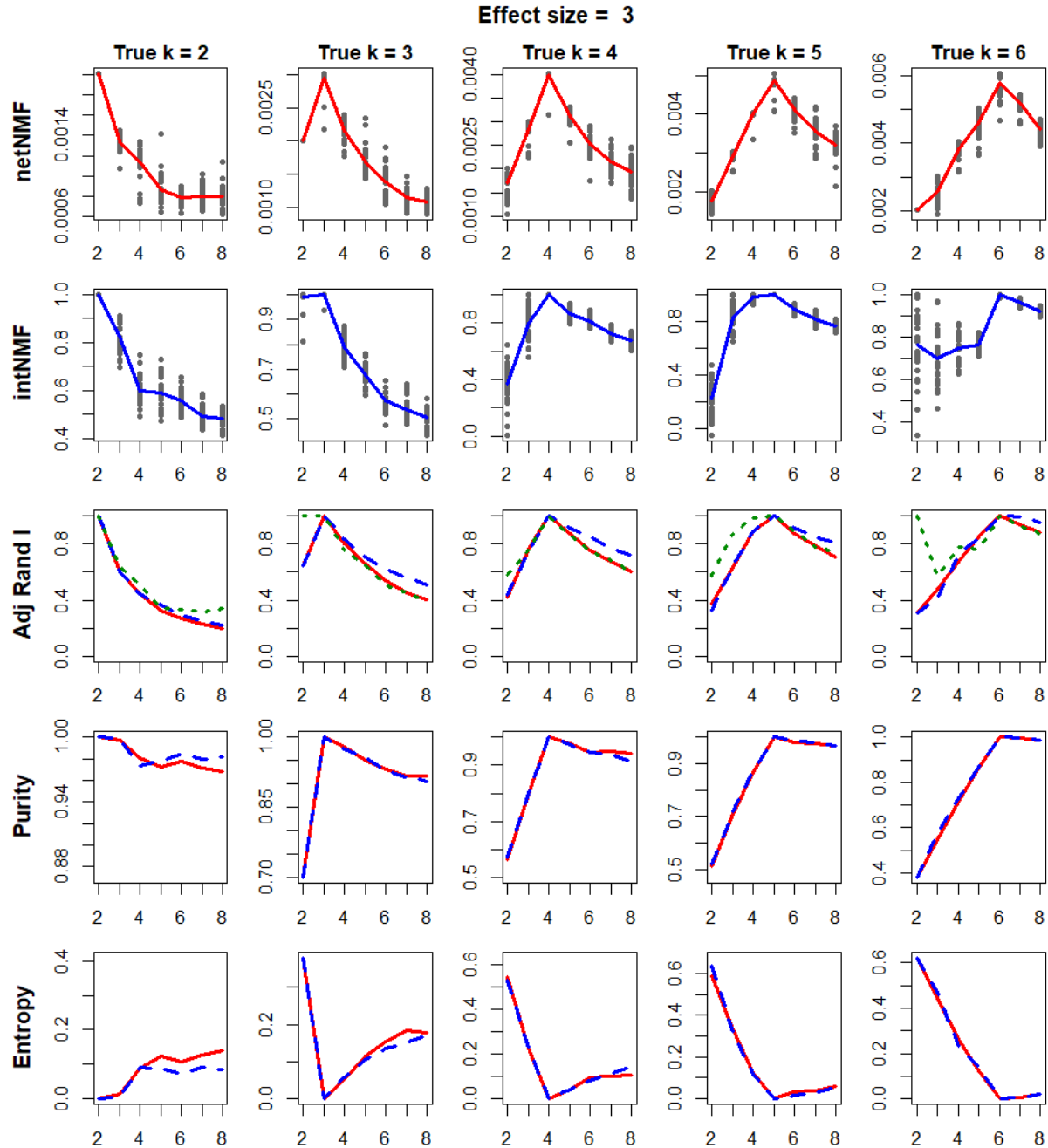
Fig. S7: Comparison of netNMF and intNMF over varying k and effect size = 3. First row represents the Silhouette width for netNMF, second row represents Cluster prediction Index (CPI) for intNMF method. The third row represents adjusted rand index between (i) true and netNMF-clusters (red), (ii) true and intNMF-clusters (blue) and (iii) netNMF-clusters and intNMF-clusters (green). Fourth and fifth rows represent the plot of *purity* and *entropy* for netNMF (red) and intNMF (blue).
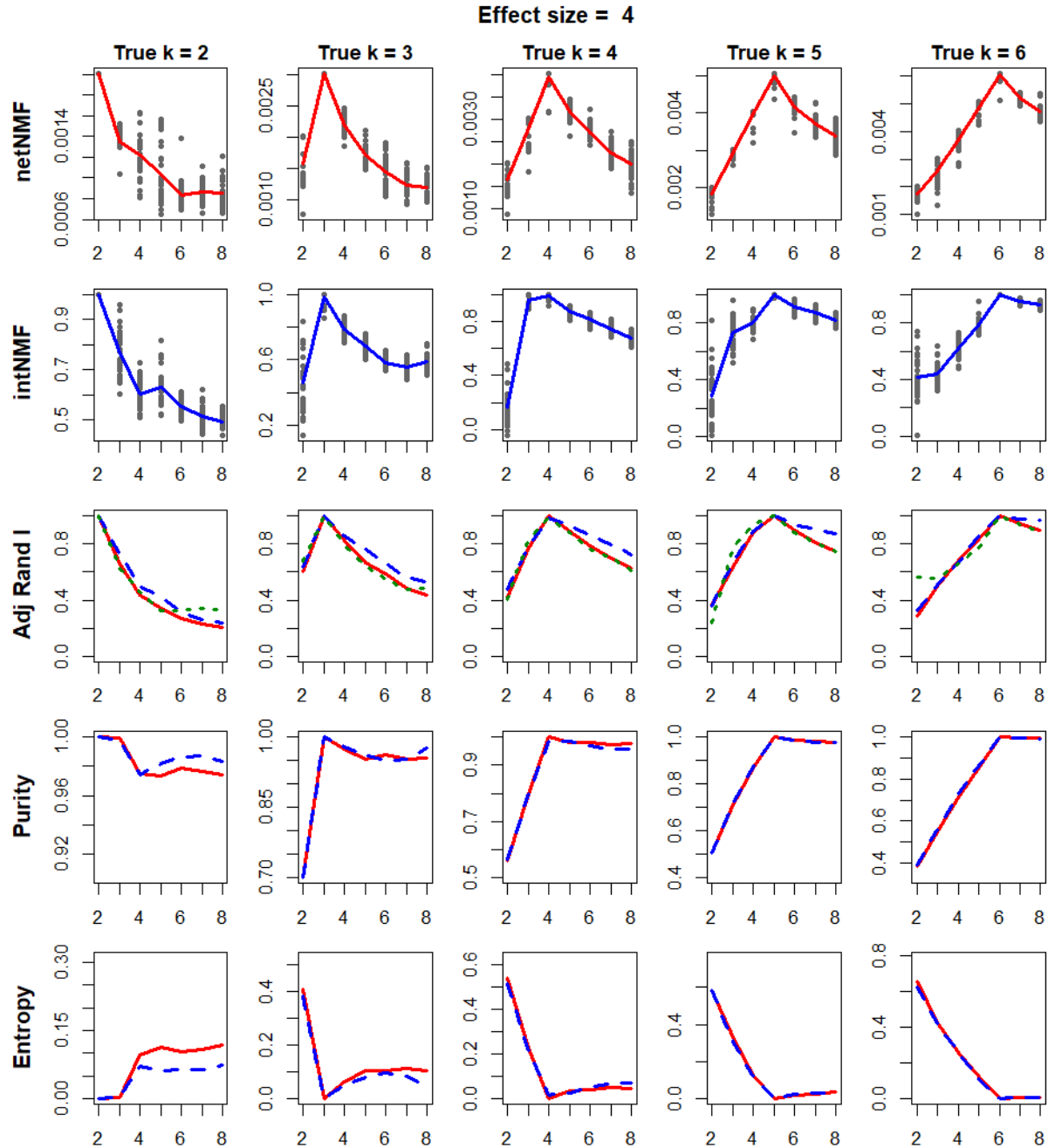
Fig. S8: Comparison of netNMF and intNMF over varying k and effect size = 4. First row represents the Silhouette width for netNMF, second row represents Cluster prediction Index (CPI) for intNMF method. The third row represents adjusted rand index between (i) true and netNMF-clusters (red), (ii) true and intNMF-clusters (blue) and (iii) netNMF-clusters and intNMF-clusters (green). Fourth and fifth rows represent the plot of *purity* and *entropy* for netNMF (red) and intNMF (blue).
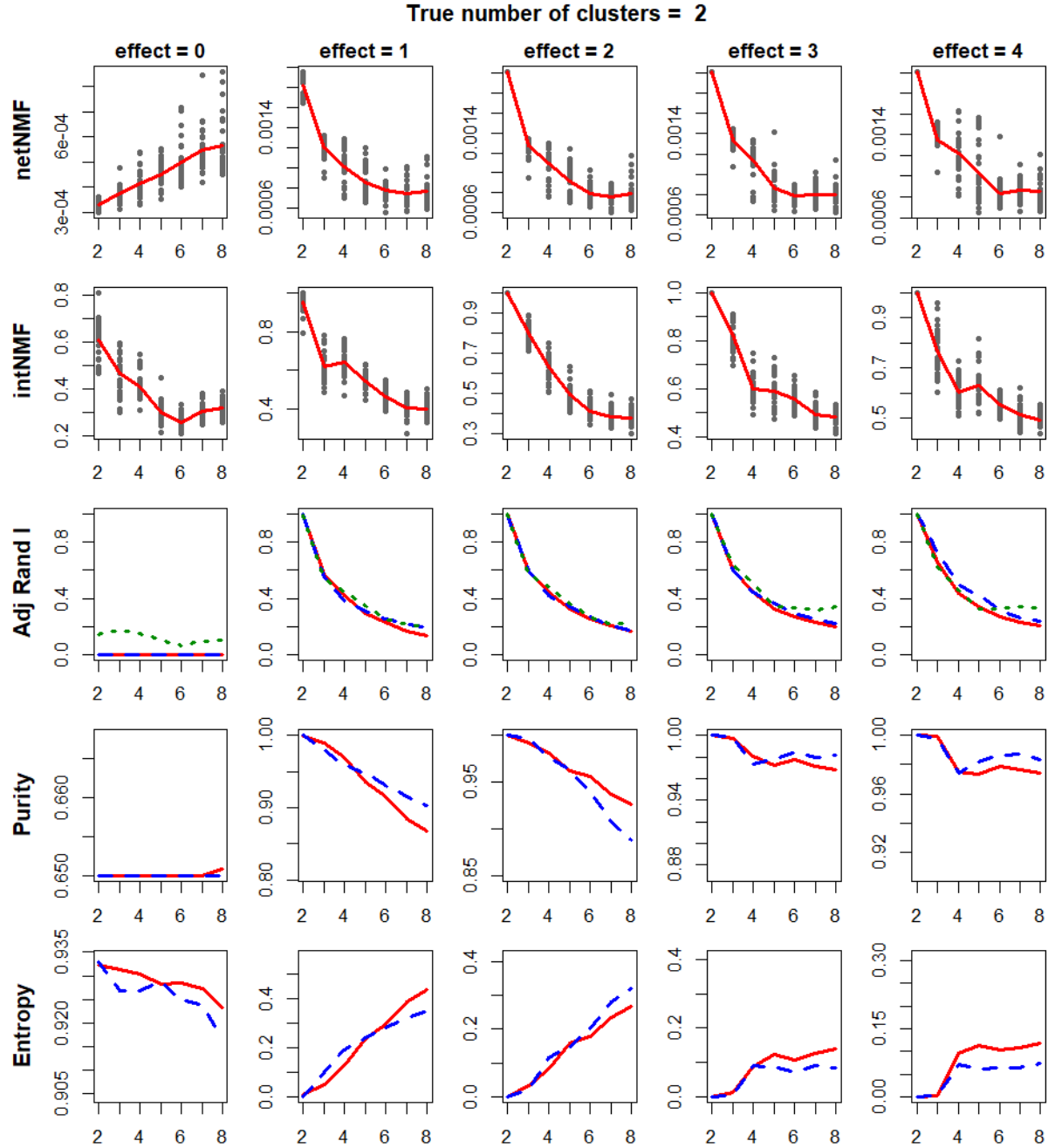
Fig. S9: Comparison of netNMF and intNMF over varying effect size and k = 2. First row represents the Silhouette width for netNMF, second row represents Cluster prediction Index (CPI) for intNMF method. The third row represents adjusted rand index between (i) true and netNMF-clusters (red), (ii) true and intNMF-clusters (blue) and (iii) netNMF-clusters and intNMF-clusters (green). Fourth and fifth rows represent the plot of *purity* and *entropy* for netNMF (red) and intNMF (blue).
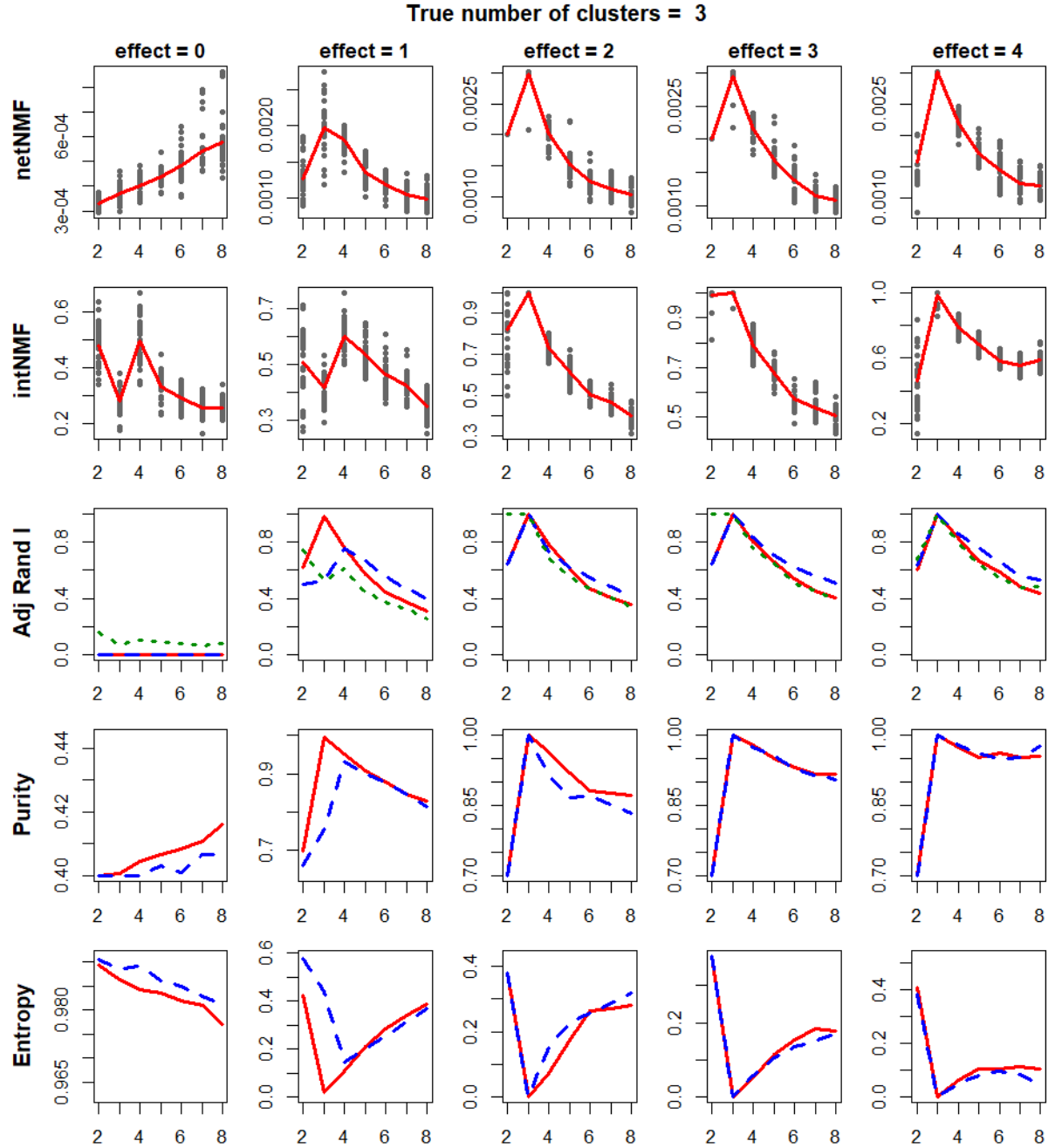
Fig. S10: Comparison of netNMF and intNMF over varying effect size and k = 3. First row represents the Silhouette width for netNMF, second row represents Cluster prediction Index (CPI) for intNMF method. The third row represents adjusted rand index between (i) true and netNMF-clusters (red), (ii) true and intNMF-clusters (blue) and (iii) netNMF-clusters and intNMF-clusters (green). Fourth and fifth rows represent the plot of *purity* and *entropy* for netNMF (red) and intNMF (blue).
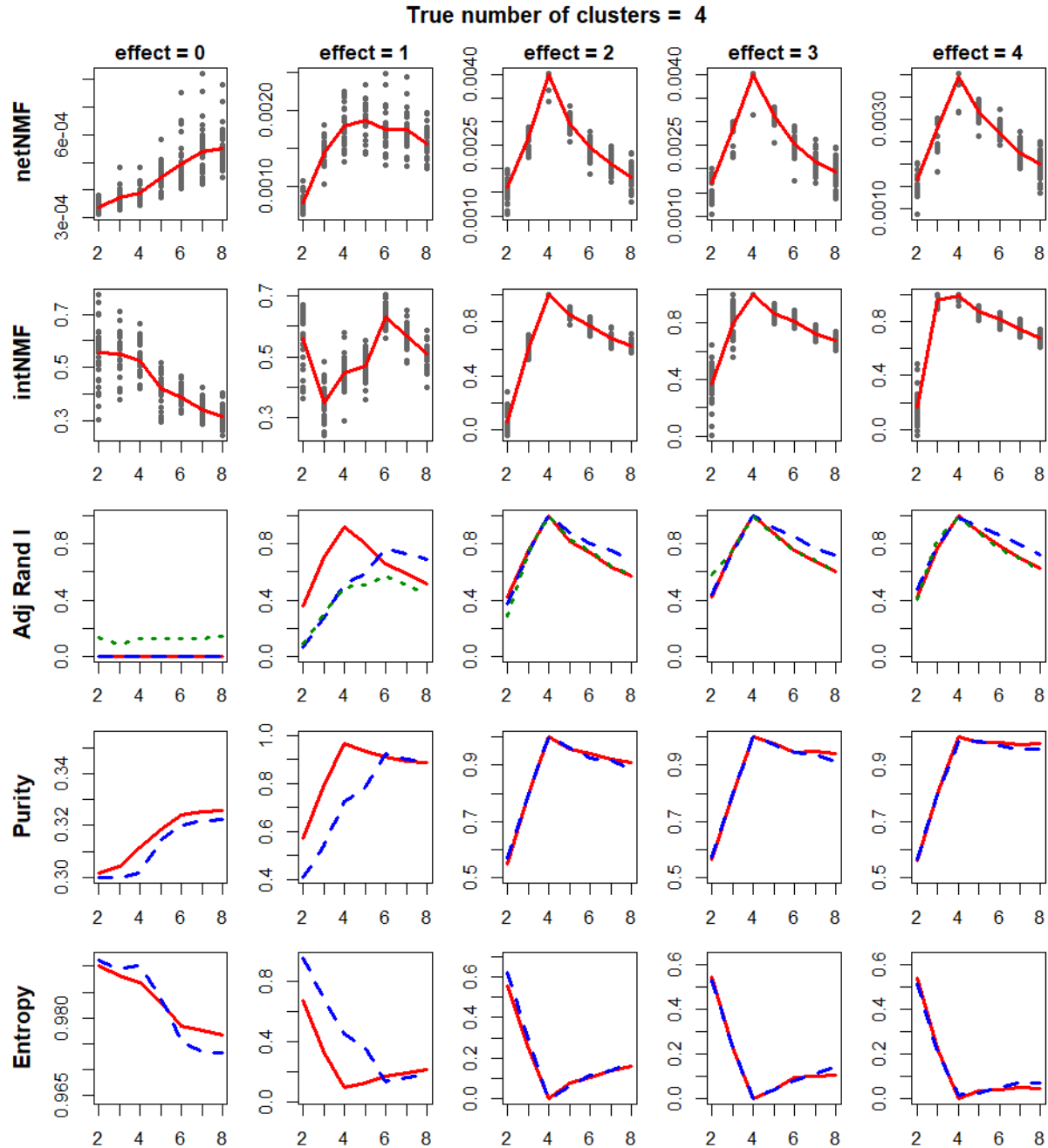
Fig. S11: Comparison of netNMF and intNMF over varying effect size and k = 4. First row represents the Silhouette width for netNMF, second row represents Cluster prediction Index (CPI) for intNMF method. The third row represents adjusted rand index between (i) true and netNMF-clusters (red), (ii) true and intNMF-clusters (blue) and (iii) netNMF-clusters and intNMF-clusters (green). Fourth and fifth rows represent the plot of *purity* and *entropy* for netNMF (red) and intNMF (blue).
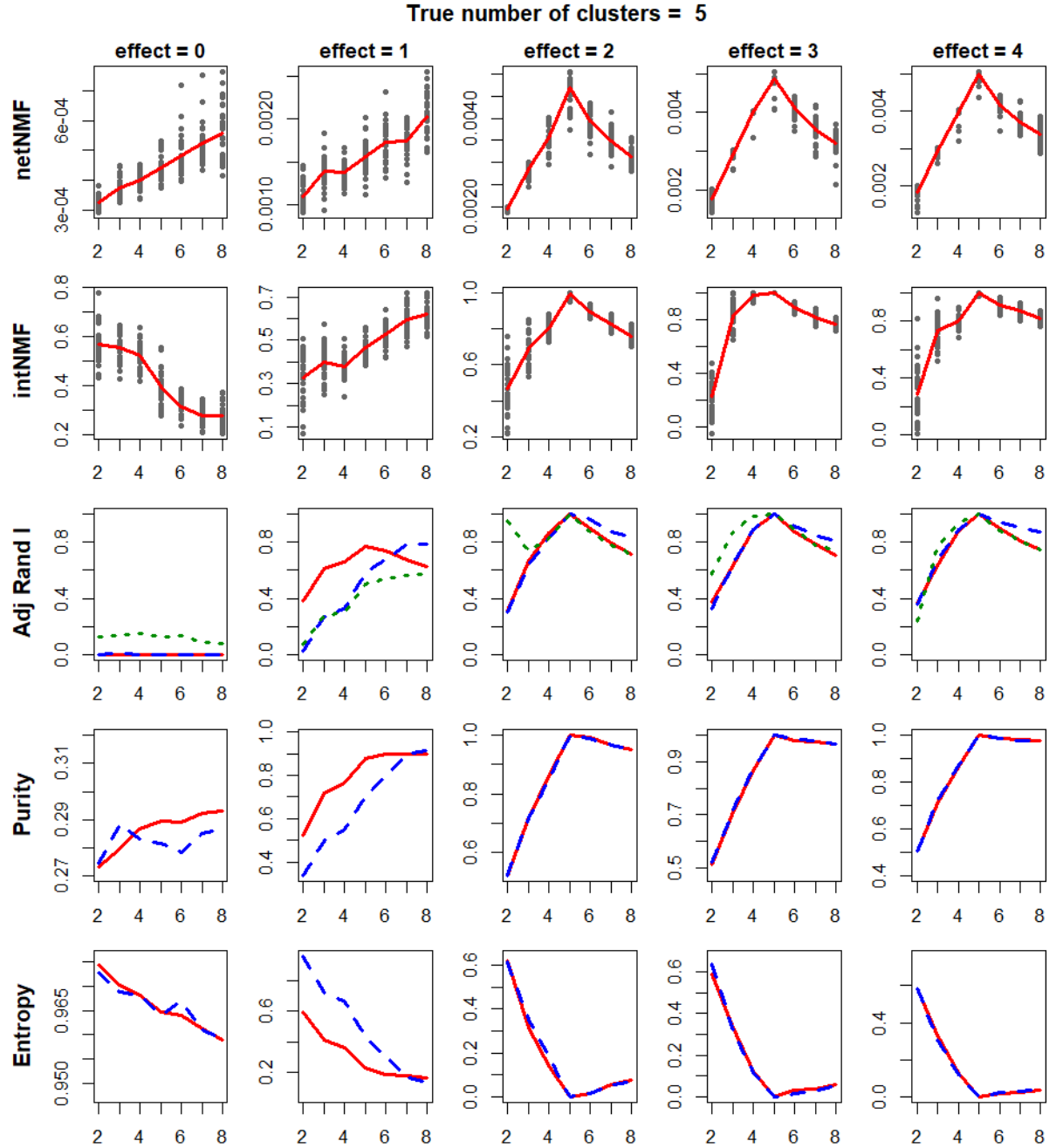
Fig. S12: Comparison of netNMF and intNMF over varying effect size and k = 5. First row represents the Silhouette width for netNMF, second row represents Cluster prediction Index (CPI) for intNMF method. The third row represents adjusted rand index between (i) true and netNMF-clusters (red), (ii) true and intNMF-clusters (blue) and (iii) netNMF-clusters and intNMF-clusters (green). Fourth and fifth rows represent the plot of *purity* and *entropy* for netNMF (red) and intNMF (blue).
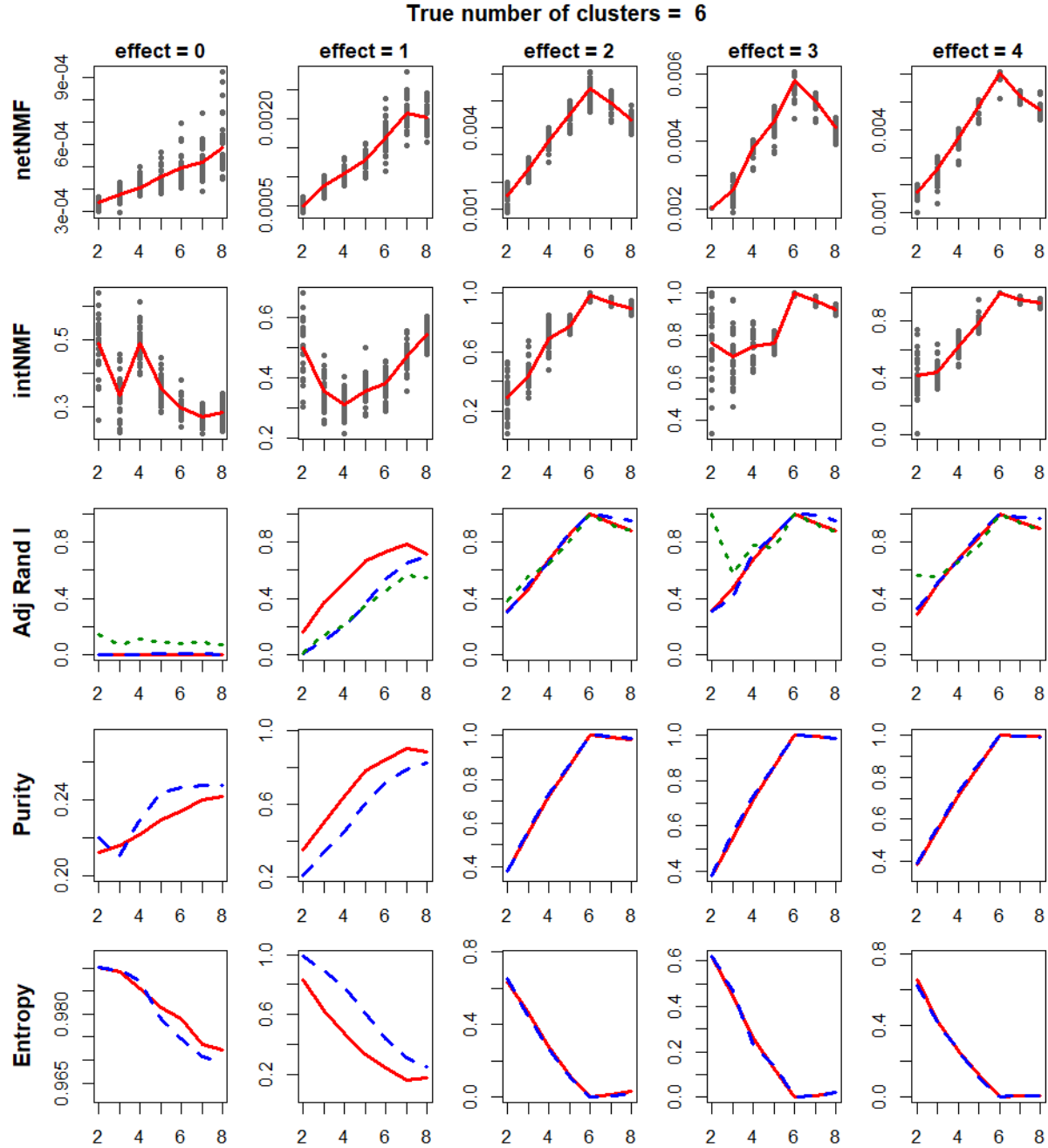
Fig. S13: Comparison of netNMF and intNMF over varying effect size and k = 6. First row represents the Silhouette width for netNMF, second row represents Cluster prediction Index (CPI) for intNMF method. The third row represents adjusted rand index between (i) true and netNMF-clusters (red), (ii) true and intNMF-clusters (blue) and (iii) netNMF-clusters and intNMF-clusters (green). Fourth and fifth rows represent the plot of *purity* and *entropy* for netNMF (red) and intNMF (blue).
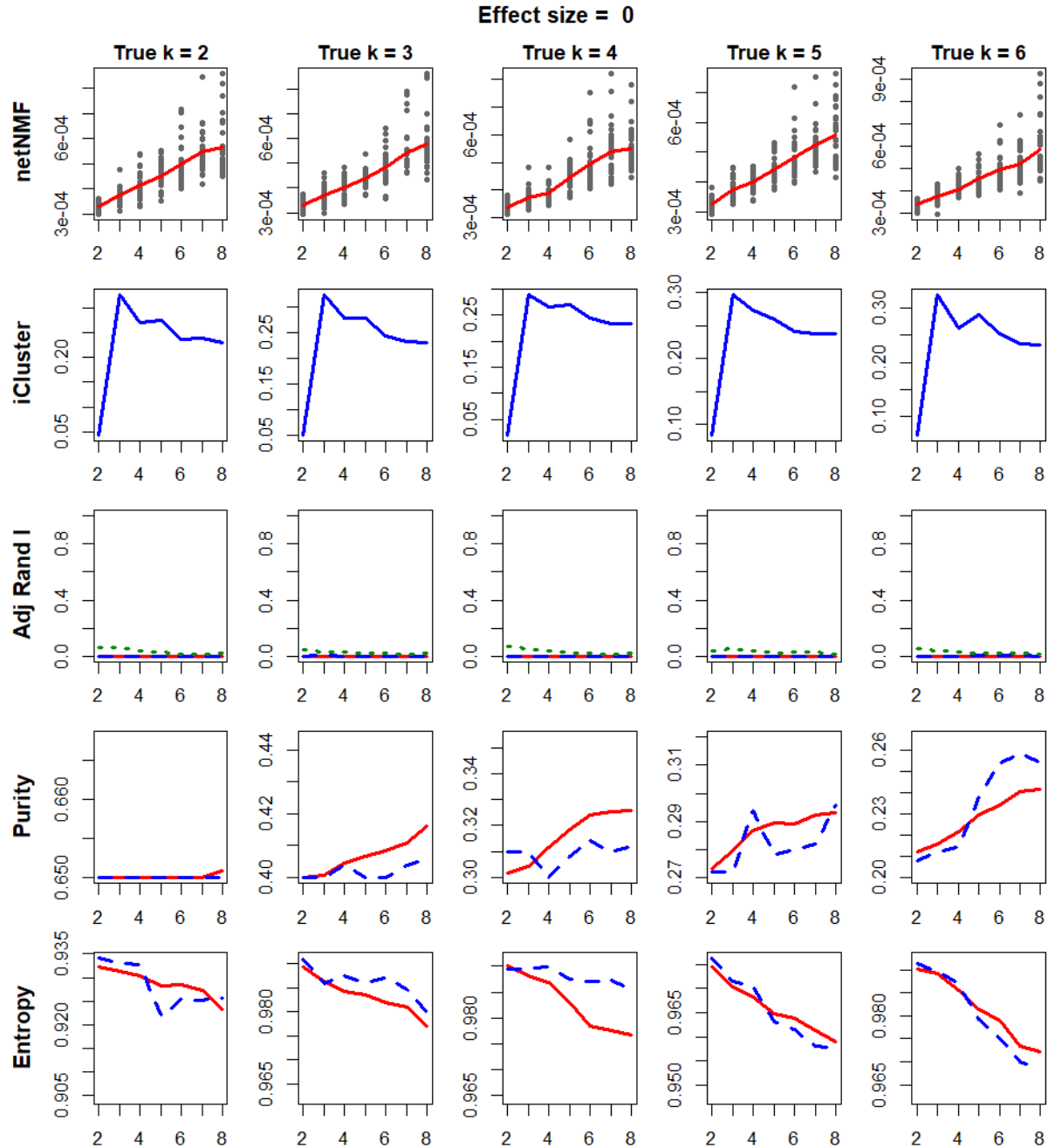
Fig. S14: Comparison of netNMF and iCluster over varying k and effect size = 0. First row represents the Silhouette width for netNMF, second row represents Proportion of Deviance (POD) for iCluster method. The third row represents adjusted rand index between (i) true and netNMF-clusters (red), (ii) true and iCluster-clusters (blue) and (iii) netNMF-clusters and iCluster-clusters (green). Fourth and fifth rows represent the plot of *purity* and *entropy* for netNMF (red) and iCluster (blue).
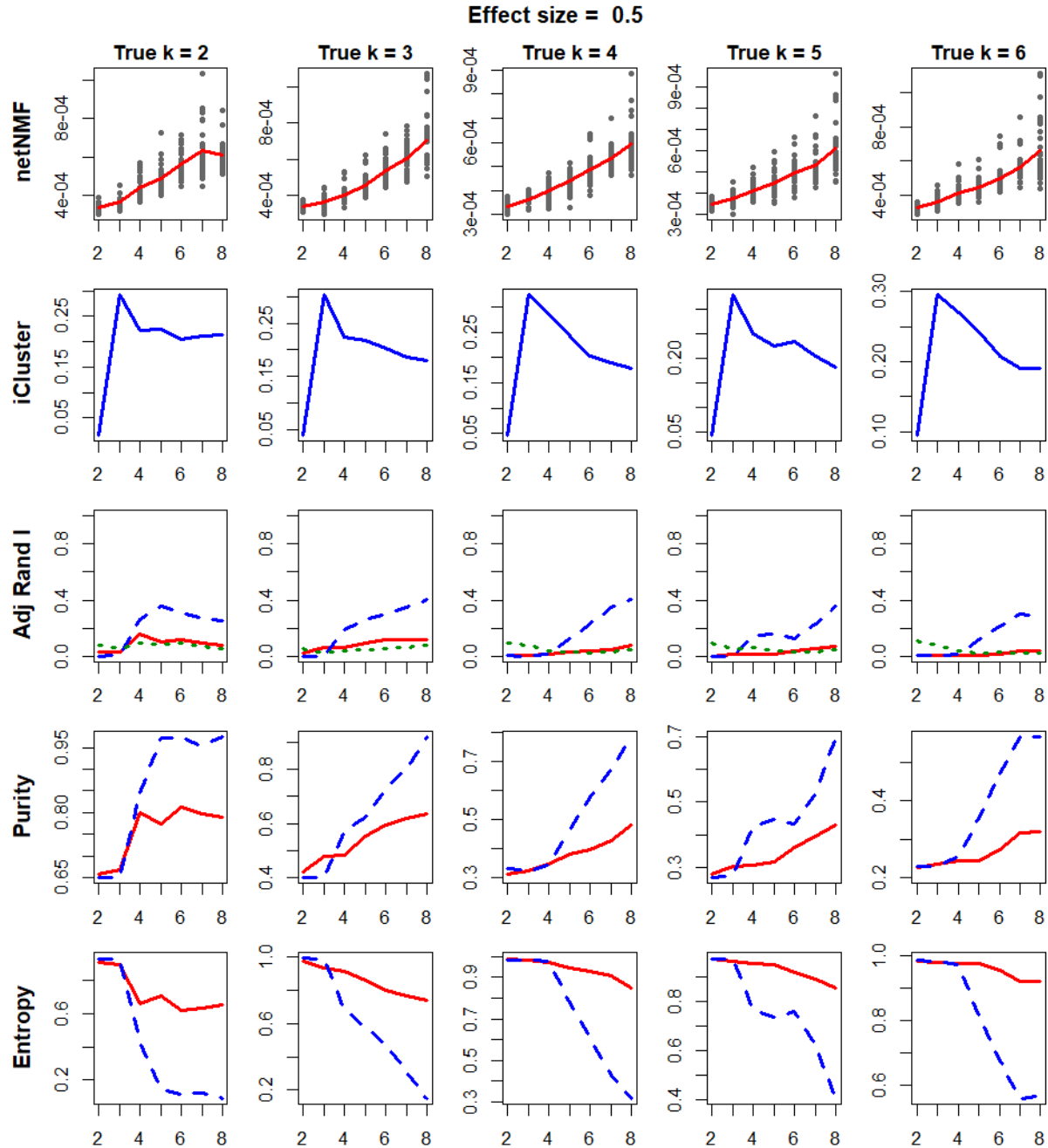
Fig. S15: Comparison of netNMF and iCluster over varying k and effect size = 0.5. First row represents the Silhouette width for netNMF, second row represents Proportion of Deviance (POD) for iCluster method. The third row represents adjusted rand index between (i) true and netNMF-clusters (red), (ii) true and iCluster-clusters (blue) and (iii) netNMF-clusters and iCluster-clusters (green). Fourth and fifth rows represent the plot of *purity* and *entropy* for netNMF (red) and iCluster (blue).
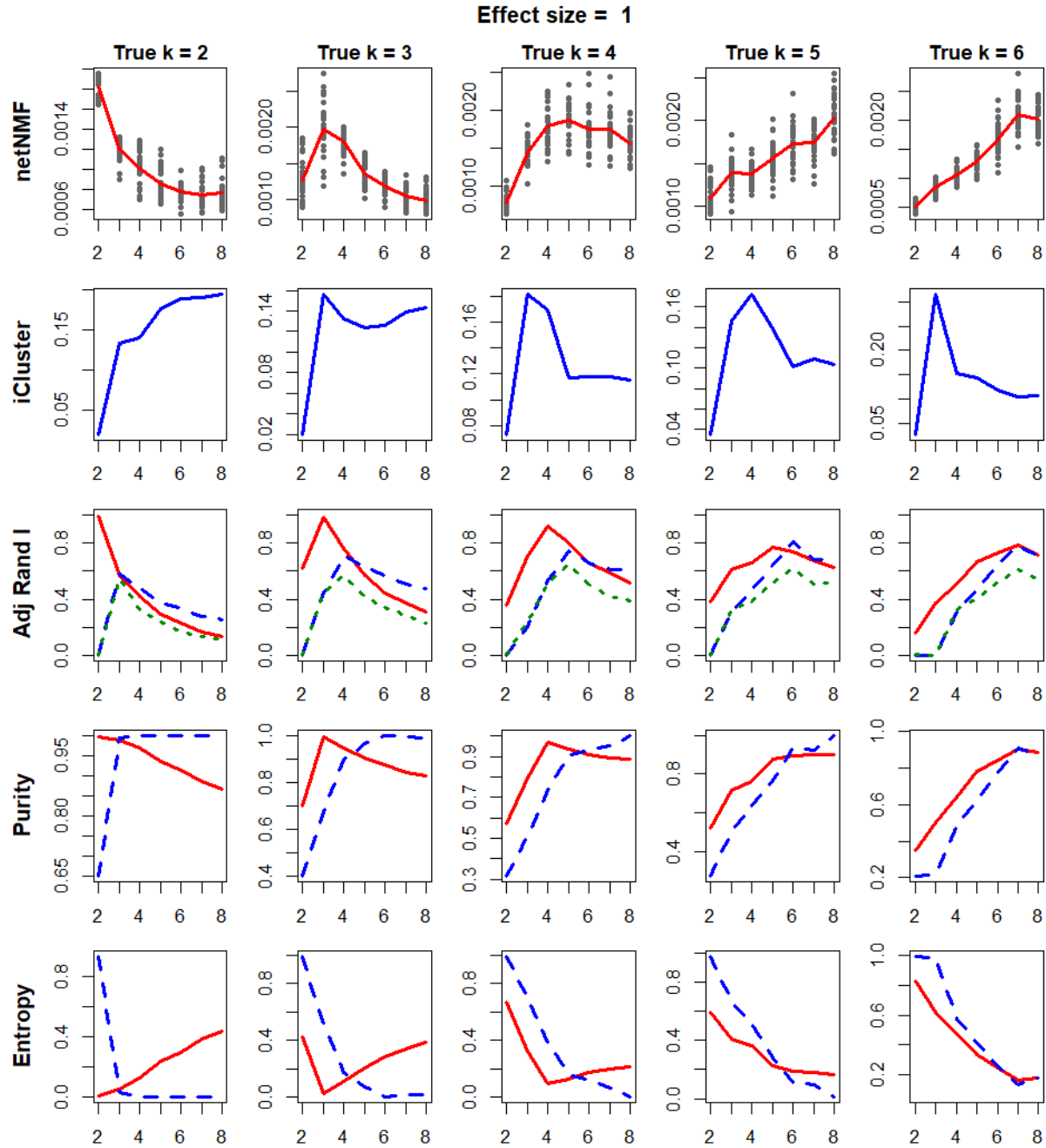
Fig. S16: Comparison of netNMF and iCluster over varying k and effect size = 1.0. First row represents the Silhouette width for netNMF, second row represents Proportion of Deviance (POD) for iCluster method. The third row represents adjusted rand index between (i) true and netNMF-clusters (red), (ii) true and iCluster-clusters (blue) and (iii) netNMF-clusters and iCluster-clusters (green). Fourth and fifth rows represent the plot of *purity* and *entropy* for netNMF (red) and iCluster (blue).
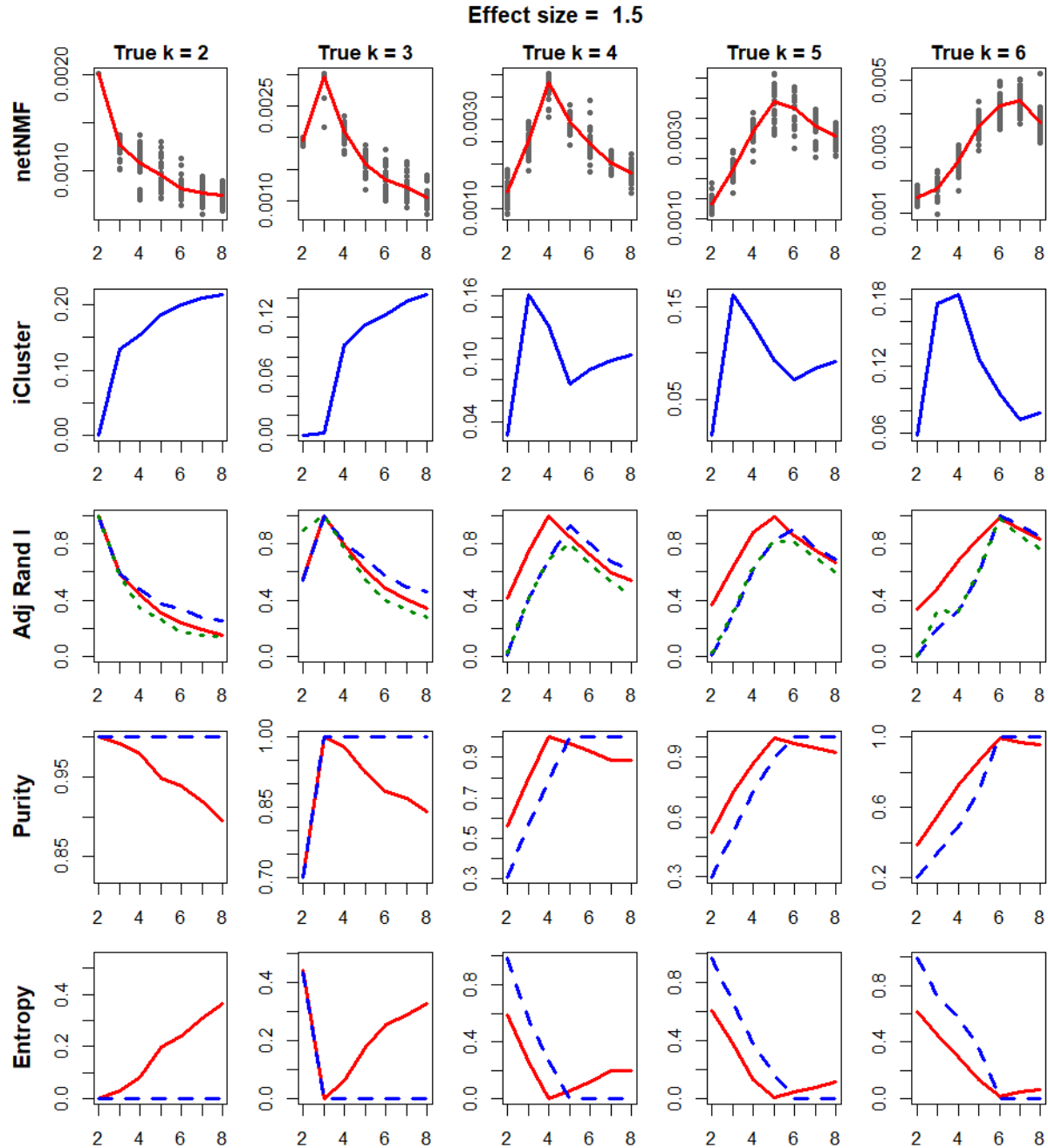
Fig. S17: Comparison of netNMF and iCluster over varying k and effect size = 1.5. First row represents the Silhouette width for netNMF, second row represents Proportion of Deviance (POD) for iCluster method. The third row represents adjusted rand index between (i) true and netNMF-clusters (red), (ii) true and iCluster-clusters (blue) and (iii) netNMF-clusters and iCluster-clusters (green). Fourth and fifth rows represent the plot of *purity* and *entropy* for netNMF (red) and iCluster (blue).
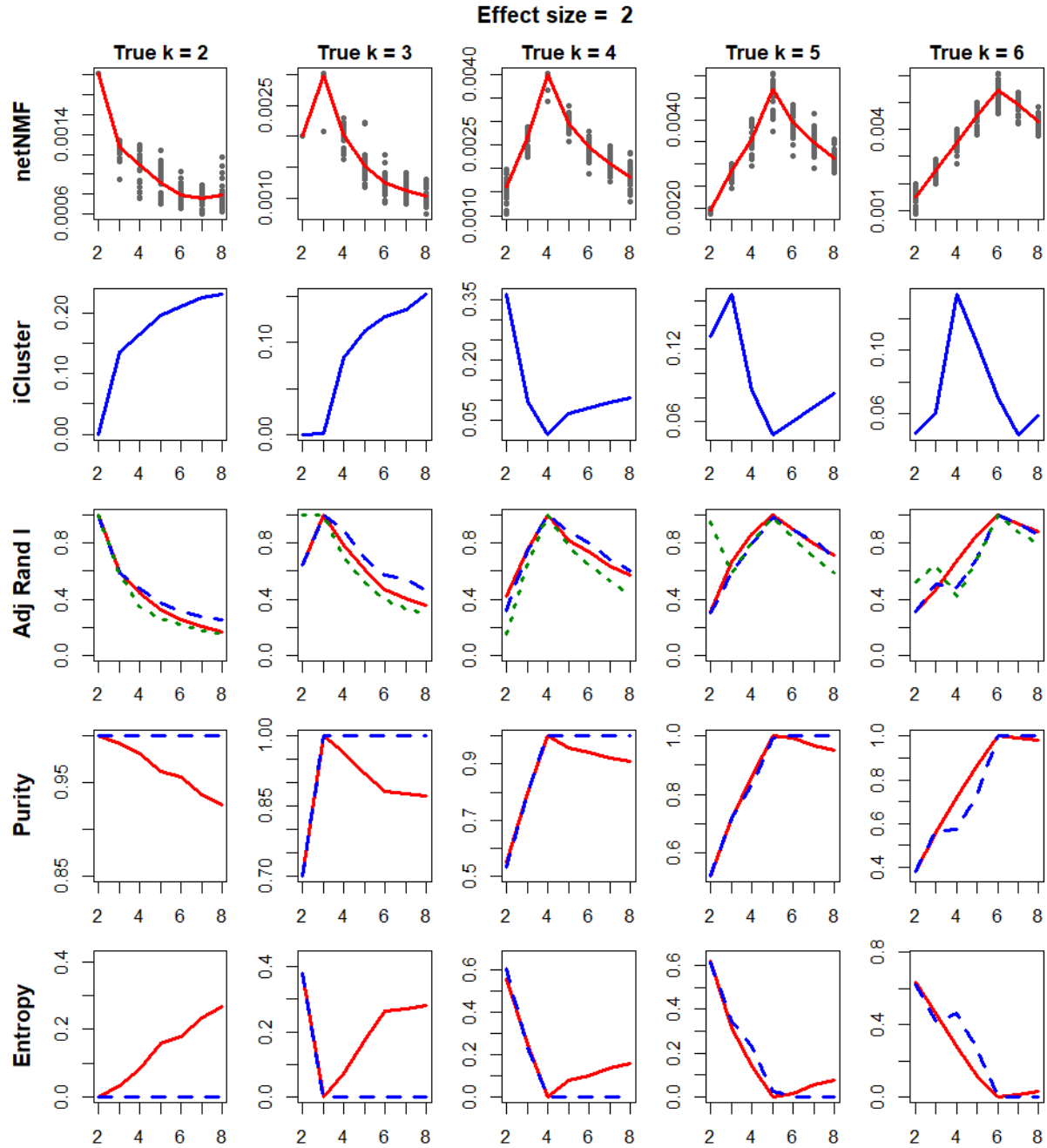
Fig. S18: Comparison of netNMF and iCluster over varying k and effect size = 2.0. First row represents the Silhouette width for netNMF, second row represents Proportion of Deviance (POD) for iCluster method. The third row represents adjusted rand index between (i) true and netNMF-clusters (red), (ii) true and iCluster-clusters (blue) and (iii) netNMF-clusters and iCluster-clusters (green). Fourth and fifth rows represent the plot of *purity* and *entropy* for netNMF (red) and iCluster (blue).
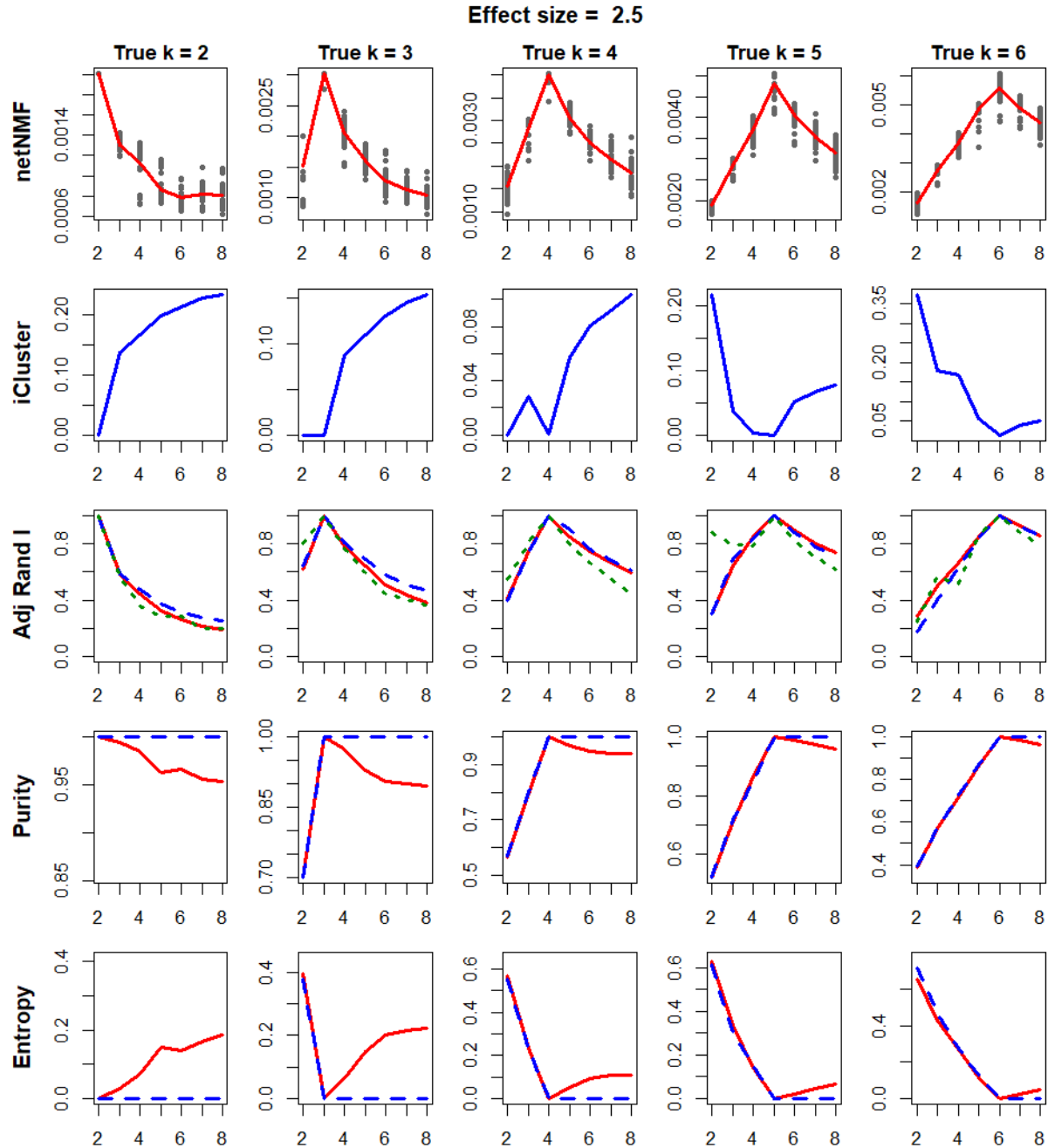
Fig. S19: Comparison of netNMF and iCluster over varying k and effect size = 2.5. First row represents the Silhouette width for netNMF, second row represents Proportion of Deviance (POD) for iCluster method. The third row represents adjusted rand index between (i) true and netNMF-clusters (red), (ii) true and iCluster-clusters (blue) and (iii) netNMF-clusters and iCluster-clusters (green). Fourth and fifth rows represent the plot of *purity* and *entropy* for netNMF (red) and iCluster (blue).
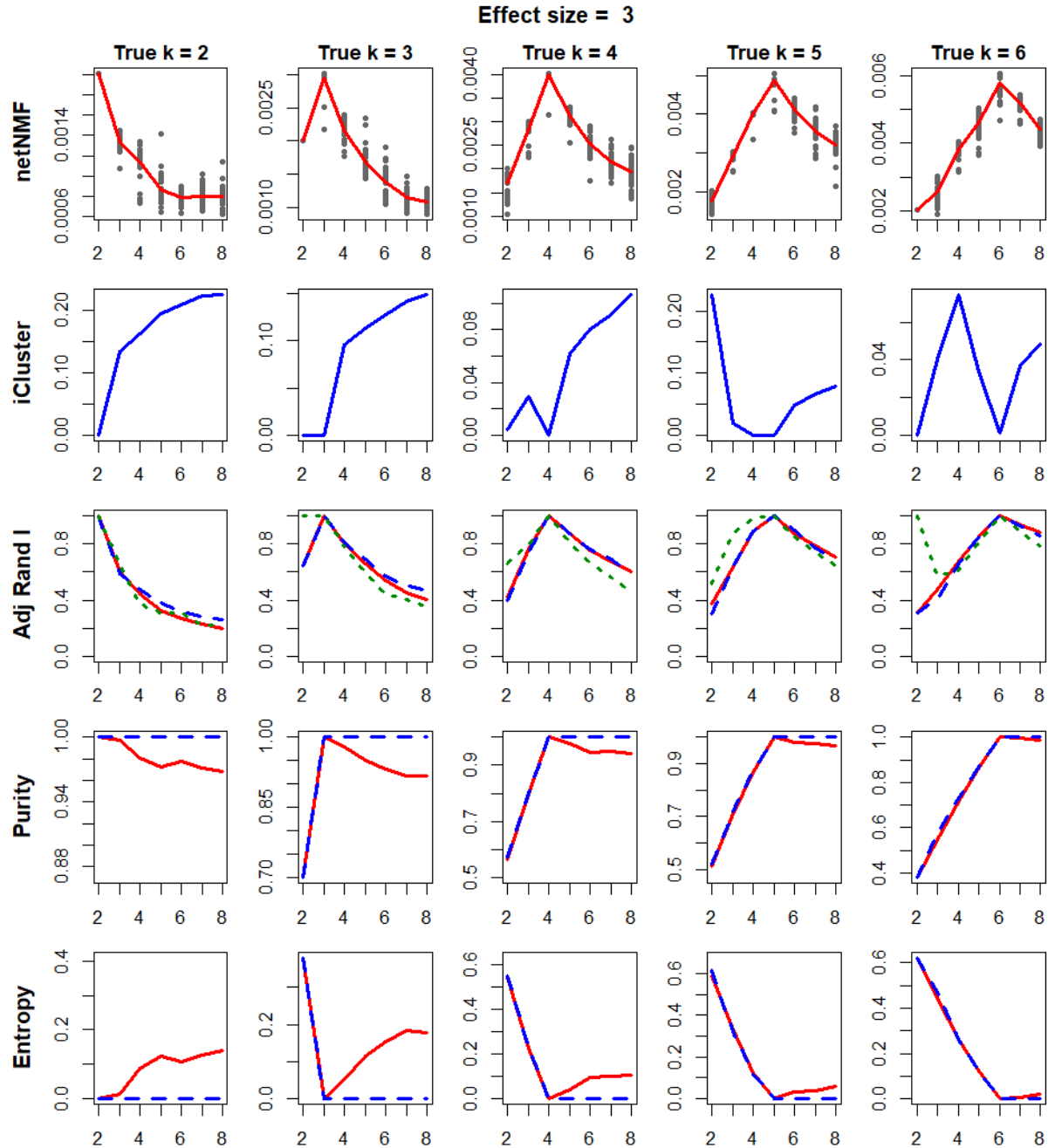
Fig. S20: Comparison of netNMF and iCluster over varying k and effect size = 3.0. First row represents the Silhouette width for netNMF, second row represents Proportion of Deviance (POD) for iCluster method. The third row represents adjusted rand index between (i) true and netNMF-clusters (red), (ii) true and iCluster-clusters (blue) and (iii) netNMF-clusters and iCluster-clusters (green). Fourth and fifth rows represent the plot of *purity* and *entropy* for netNMF (red) and iCluster (blue).
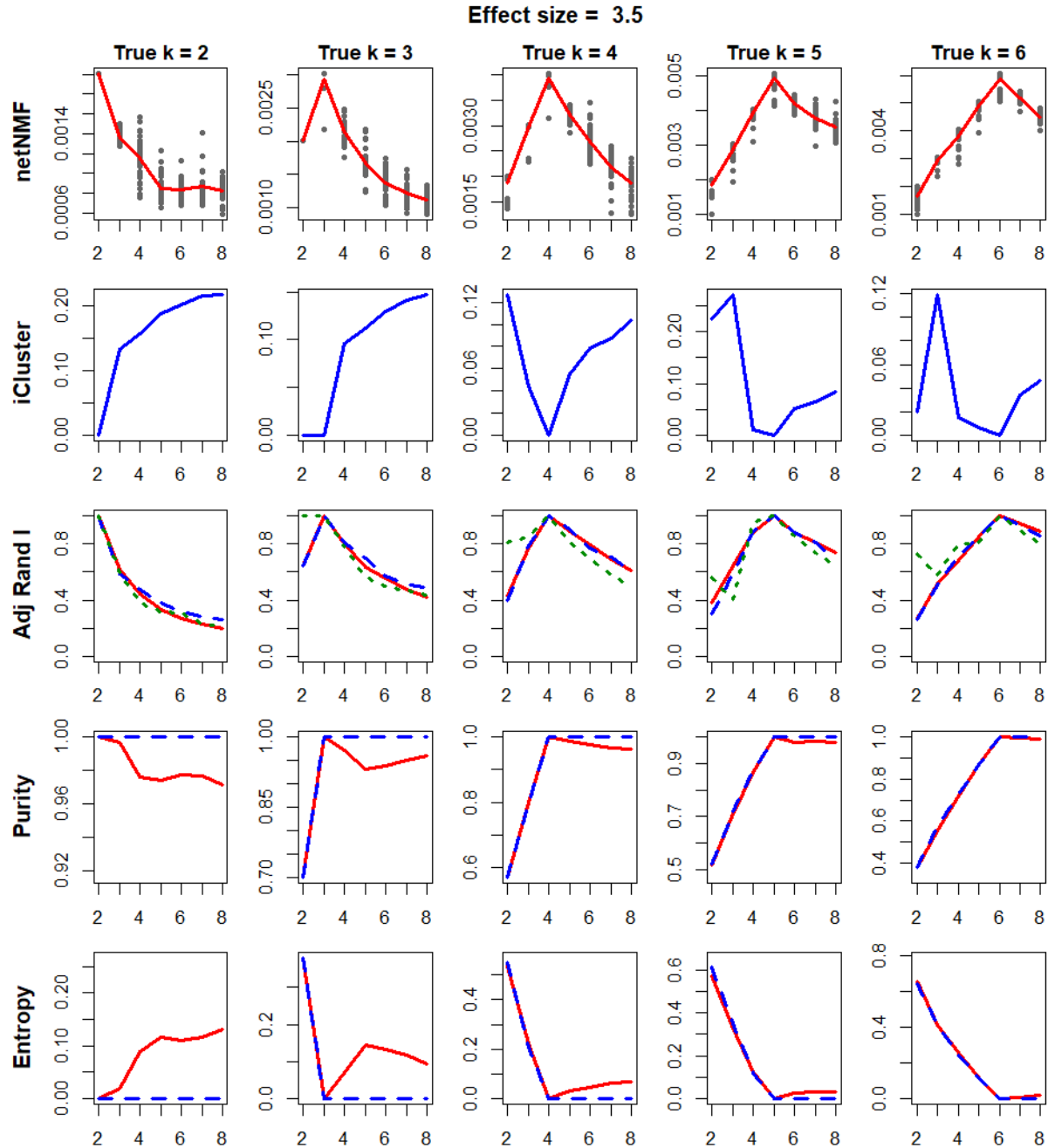
Fig. S21: Comparison of netNMF and iCluster over varying k and effect size = 3.5. First row represents the Silhouette width for netNMF, second row represents Proportion of Deviance (POD) for iCluster method. The third row represents adjusted rand index between (i) true and netNMF-clusters (red), (ii) true and iCluster-clusters (blue) and (iii) netNMF-clusters and iCluster-clusters (green). Fourth and fifth rows represent the plot of *purity* and *entropy* for netNMF (red) and iCluster (blue).
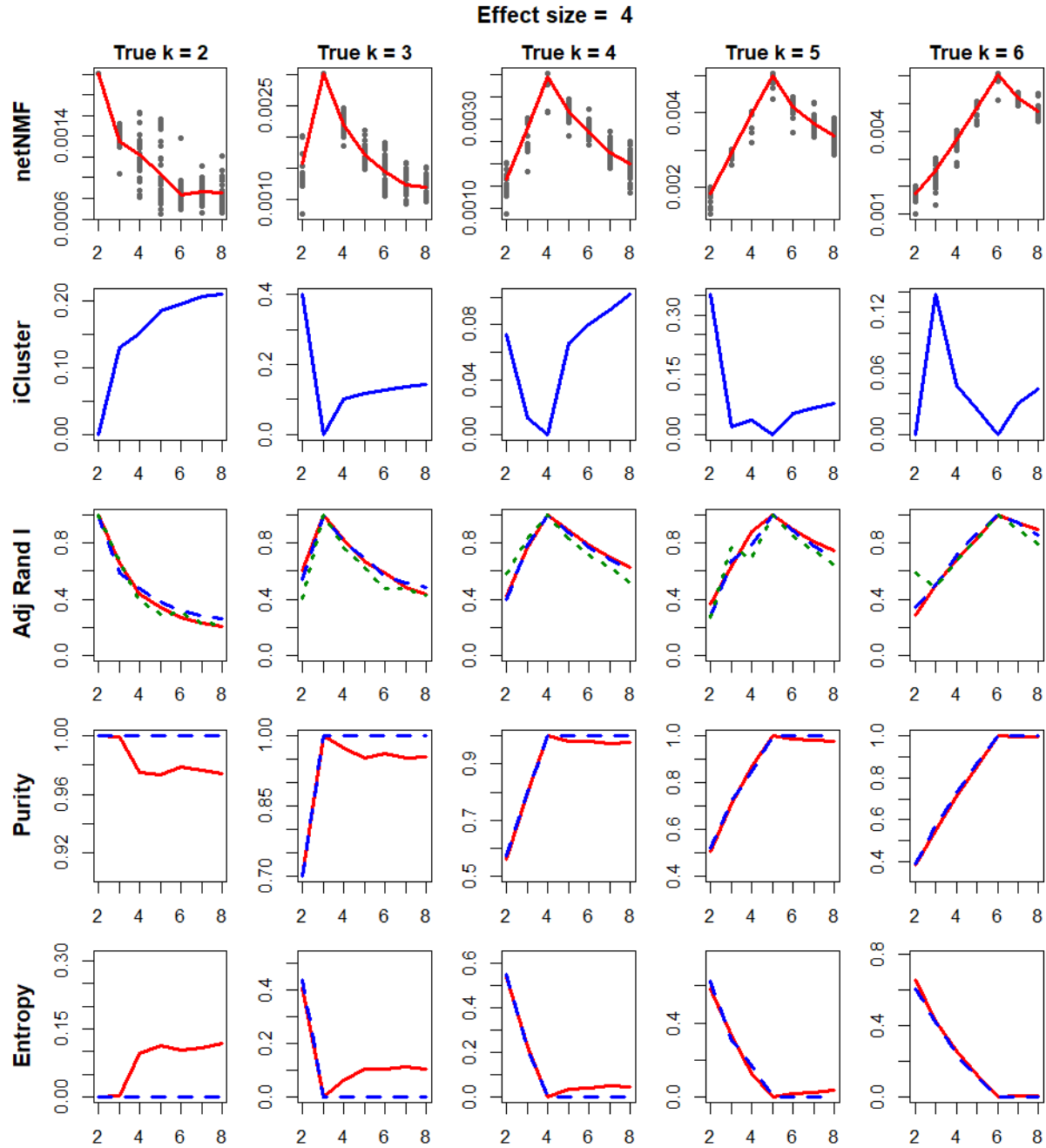
Fig. S22: Comparison of netNMF and iCluster over varying k and effect size = 4.0. First row represents the Silhouette width for netNMF, second row represents Proportion of Deviance (POD) for iCluster method. The third row represents adjusted rand index between (i) true and netNMF-clusters (red), (ii) true and iCluster-clusters (blue) and (iii) netNMF-clusters and iCluster-clusters (green). Fourth and fifth rows represent the plot of *purity* and *entropy* for netNMF (red) and iCluster (blue).
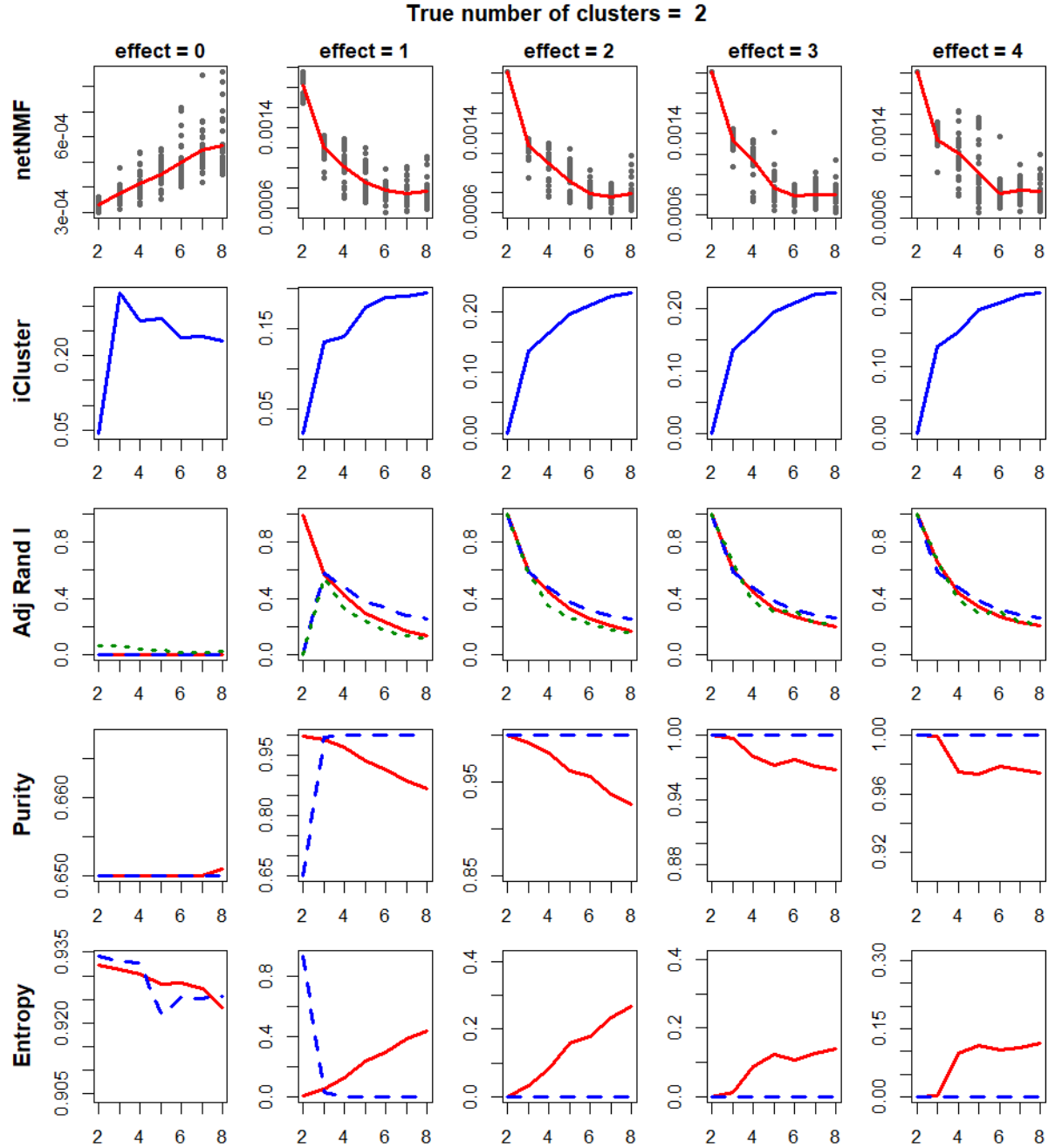
Fig. S23: Comparison of netNMF and iCluster over varying effect size and k = 2. First row represents the Silhouette width for netNMF, second row represents Proportion of Deviance (POD) for iCluster method. The third row represents adjusted rand index between (i) true and netNMF-clusters (red), (ii) true and iCluster-clusters (blue) and (iii) netNMF-clusters and iCluster-clusters (green). Fourth and fifth rows represent the plot of *purity* and *entropy* for netNMF (red) and iCluster (blue).
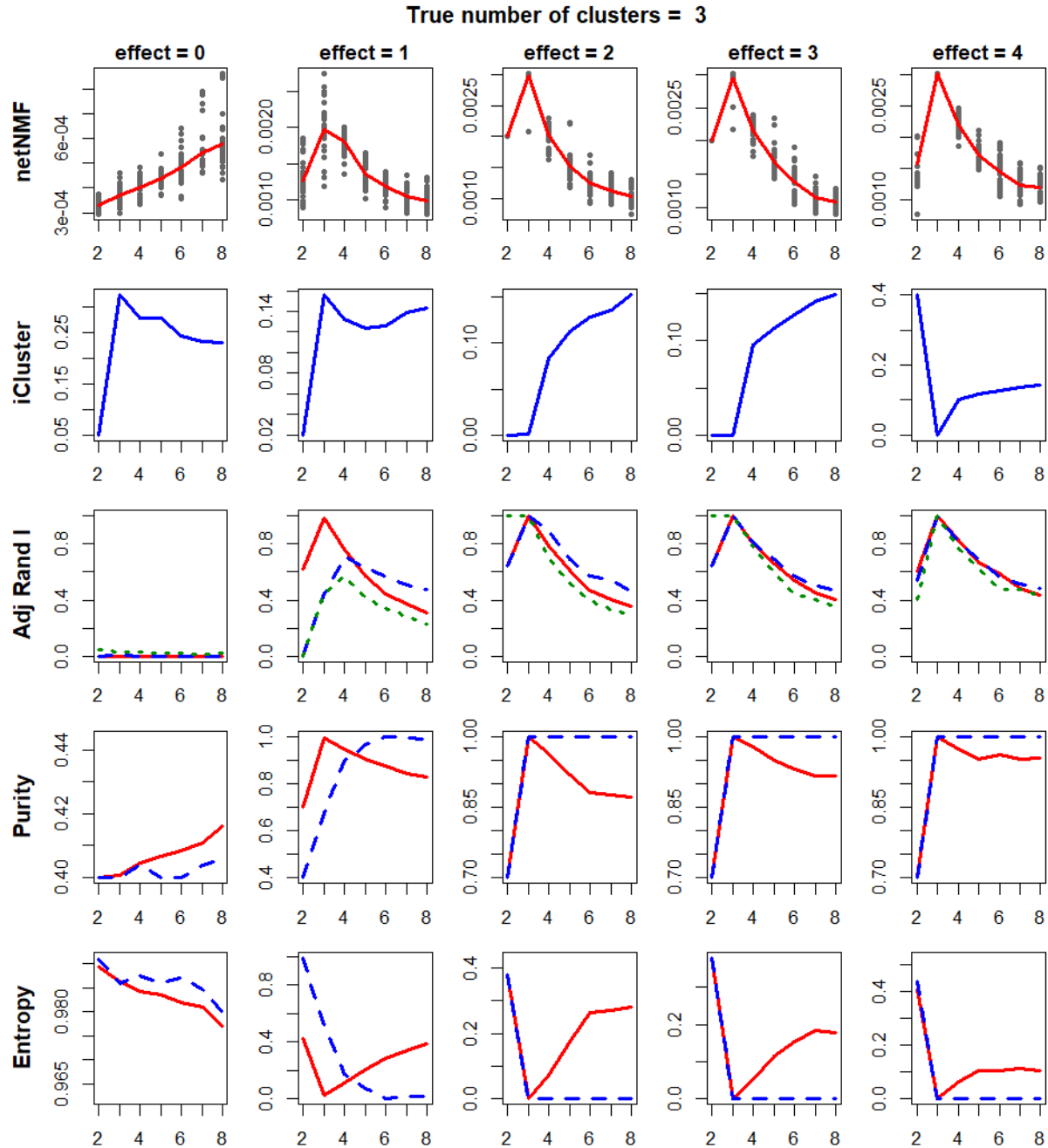
Fig. S24: Comparison of netNMF and iCluster over varying effect size and k = 3. First row represents the Silhouette width for netNMF, second row represents Proportion of Deviance (POD) for iCluster method. The third row represents adjusted rand index between (i) true and netNMF-clusters (red), (ii) true and iCluster-clusters (blue) and (iii) netNMF-clusters and iCluster-clusters (green). Fourth and fifth rows represent the plot of *purity* and *entropy* for netNMF (red) and iCluster (blue).
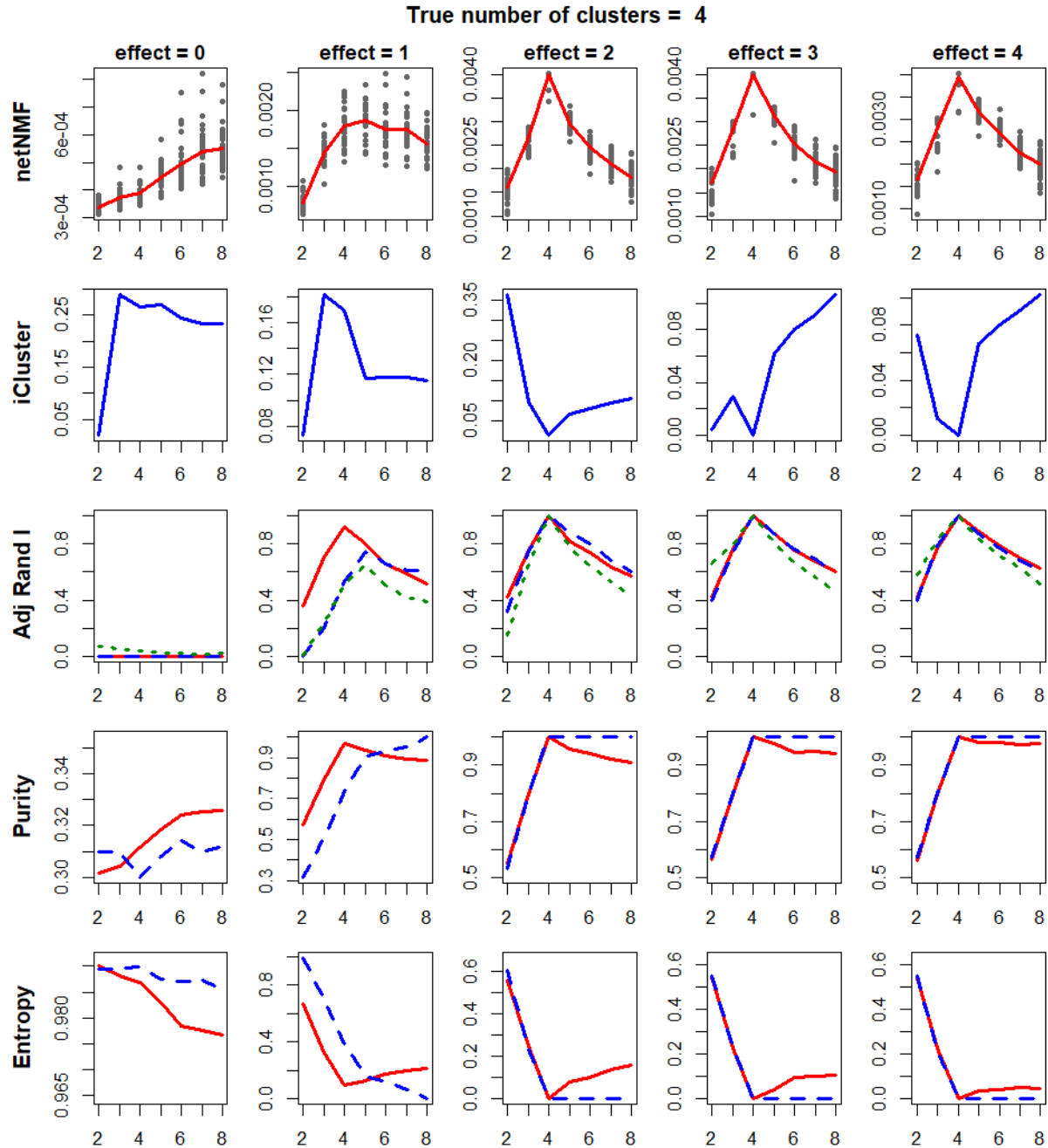
Fig. S25: Comparison of netNMF and iCluster over varying effect size and k = 4. First row represents the Silhouette width for netNMF, second row represents Proportion of Deviance (POD) for iCluster method. The third row represents adjusted rand index between (i) true and netNMF-clusters (red), (ii) true and iCluster-clusters (blue) and (iii) netNMF-clusters and iCluster-clusters (green). Fourth and fifth rows represent the plot of *purity* and *entropy* for netNMF (red) and iCluster (blue).
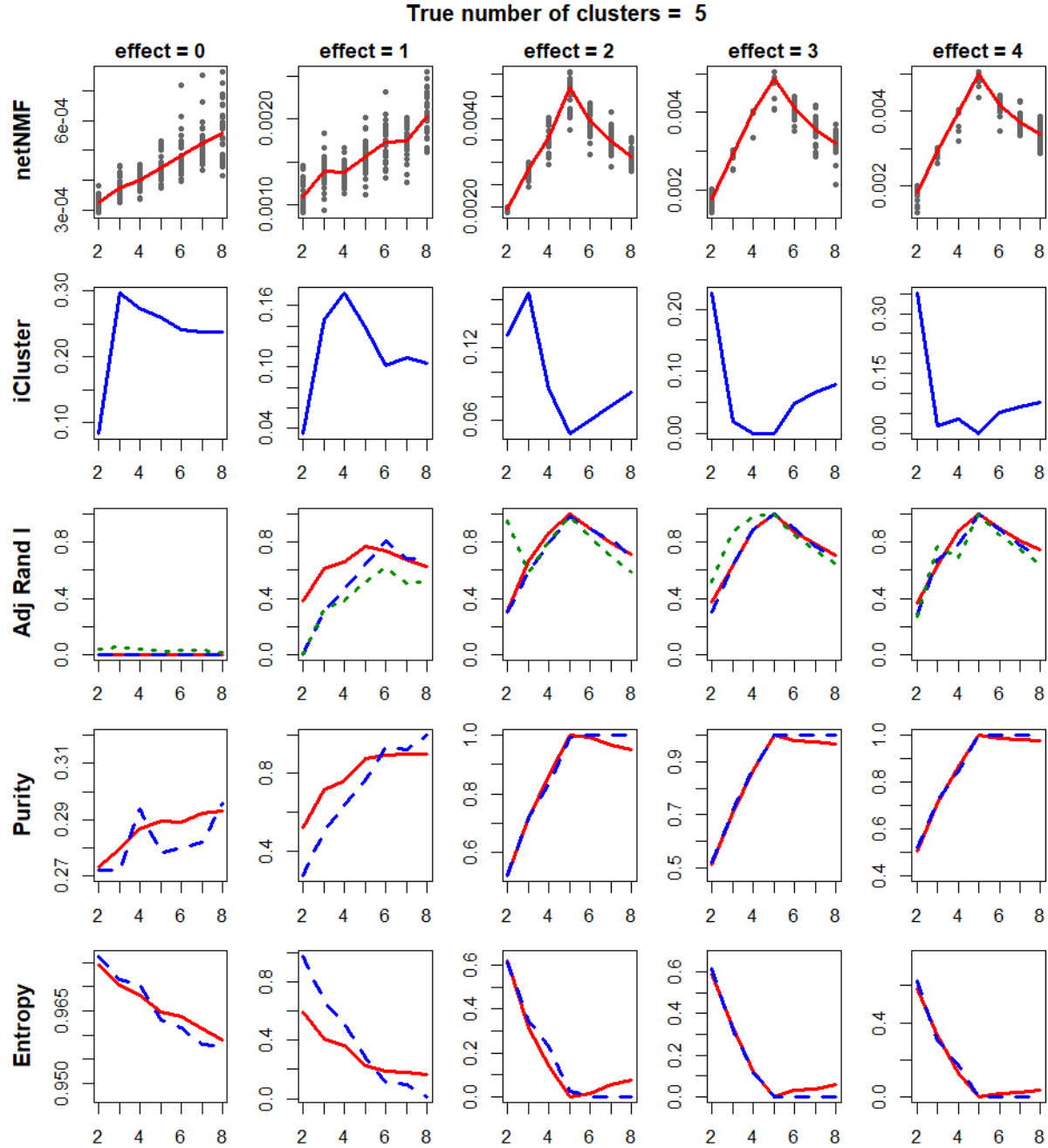
Fig. S26: Comparison of netNMF and iCluster over varying effect size and k = 5. First row represents the Silhouette width for netNMF, second row represents Proportion of Deviance (POD) for iCluster method. The third row represents adjusted rand index between (i) true and netNMF-clusters (red), (ii) true and iCluster-clusters (blue) and (iii) netNMF-clusters and iCluster-clusters (green). Fourth and fifth rows represent the plot of *purity* and *entropy* for netNMF (red) and iCluster (blue).
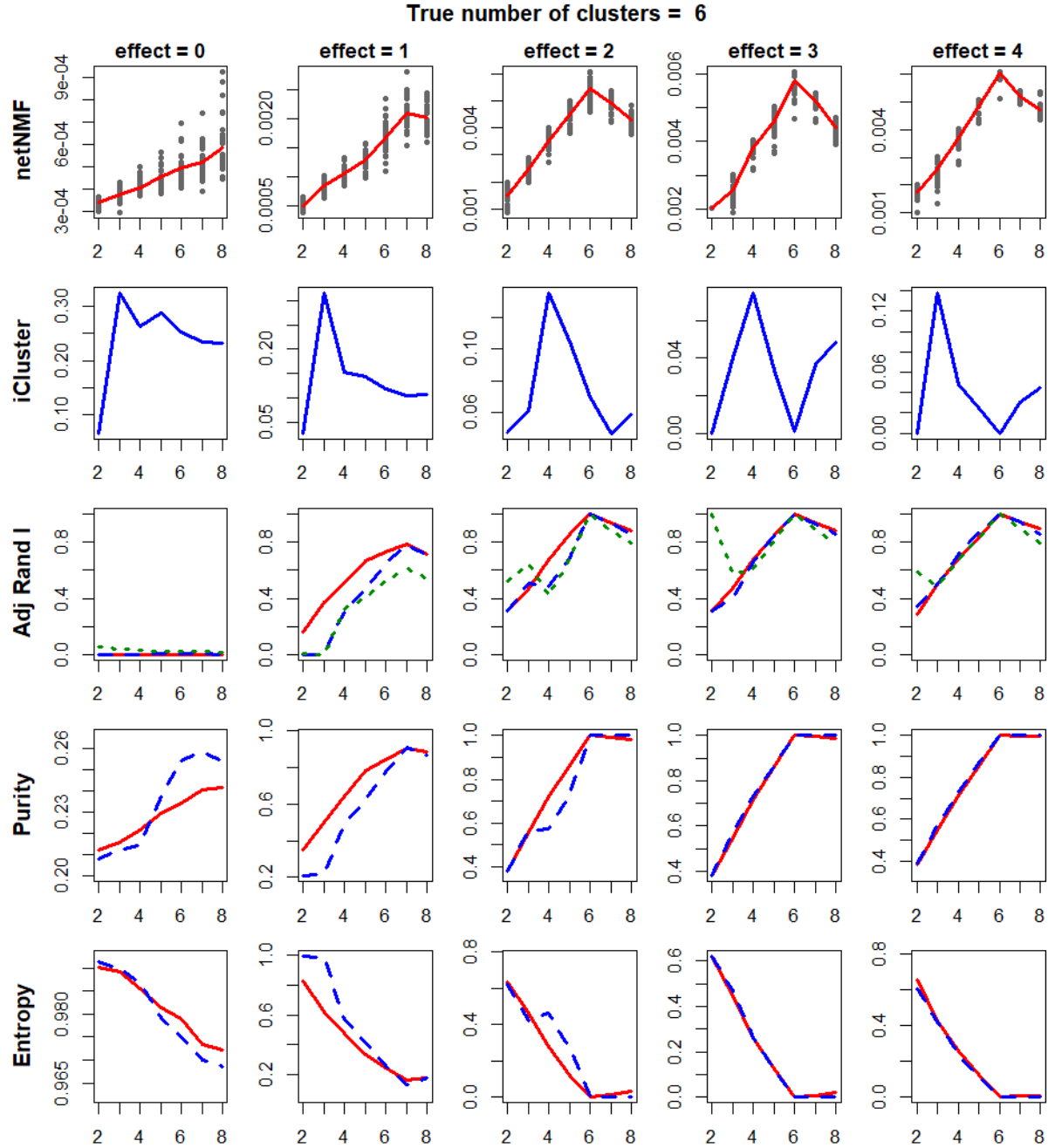
Fig. S27: Comparison of netNMF and iCluster over varying effect size and k = 6. First row represents the Silhouette width for netNMF, second row represents Proportion of Deviance (POD) for iCluster method. The third row represents adjusted rand index between (i) true and netNMF-clusters (red), (ii) true and iCluster-clusters (blue) and (iii) netNMF-clusters and iCluster-clusters (green). Fourth and fifth rows represent the plot of *purity* and *entropy* for netNMF (red) and iCluster (blue).
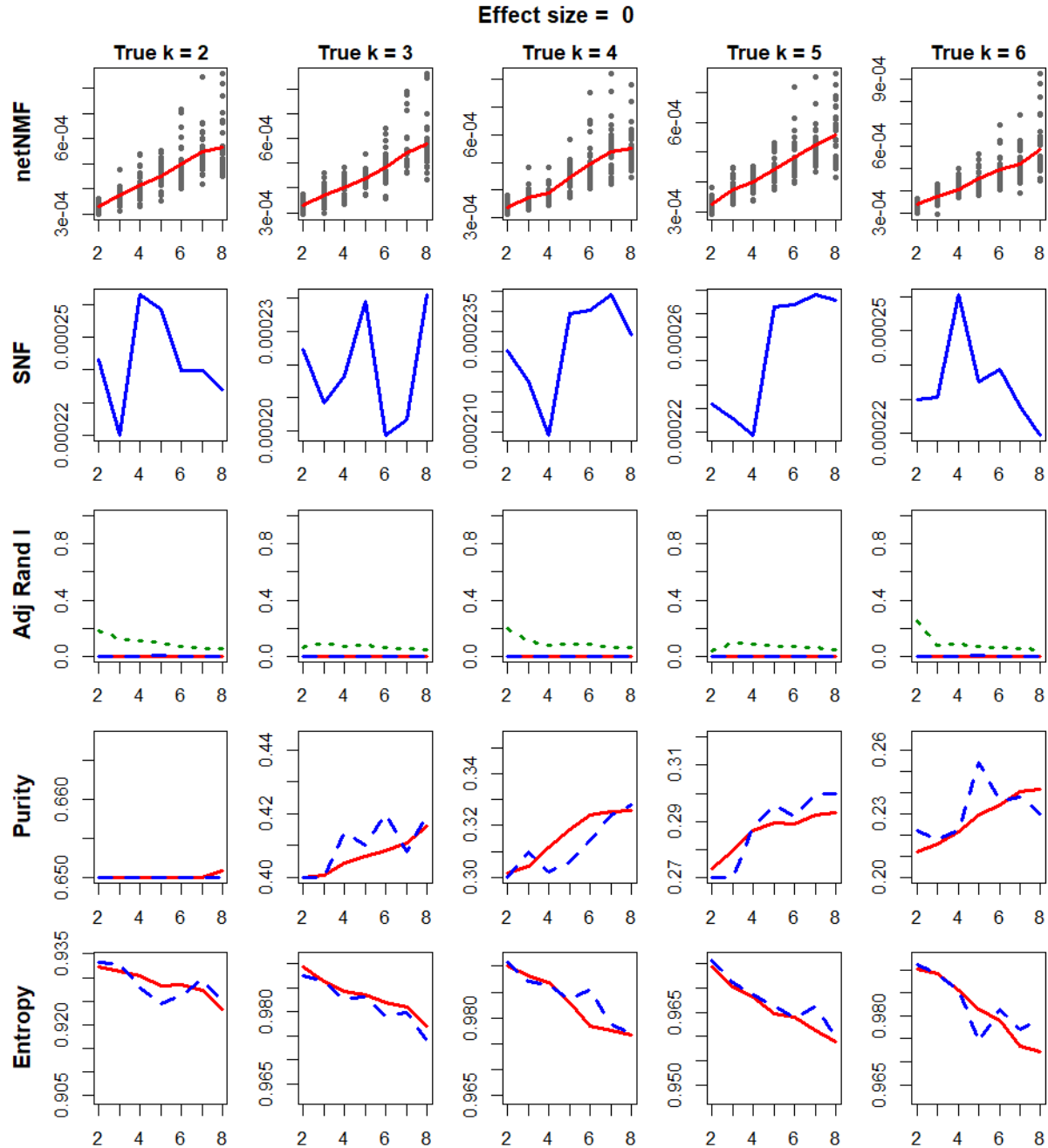
Fig. S28: Comparison of netNMF and SNF over varying k and effect size = 0. First row represents the Silhouette width for netNMF, second row represents Silhouette width for SNF method. The third row represents adjusted rand index between (i) true and netNMF-clusters (red), (ii) true and SNF-clusters (blue) and (iii) netNMF-clusters and SNF-clusters (green). Fourth and fifth rows represent the plot of *purity* and *entropy* for netNMF (red) and SNF (blue).
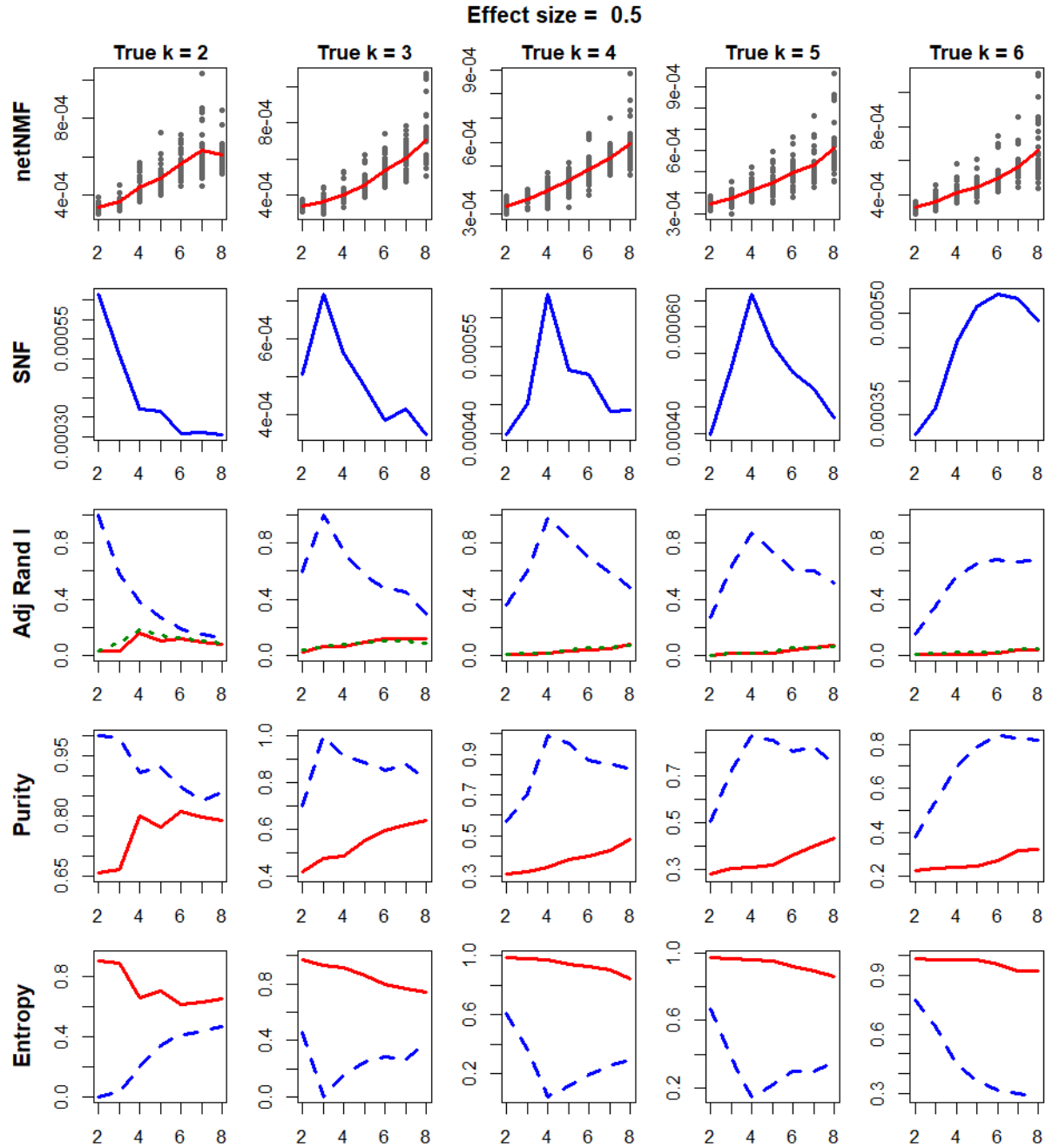
Fig. S29: Comparison of netNMF and SNF over varying k and effect size = 0.5. First row represents the Silhouette width for netNMF, second row represents Silhouette width for SNF method. The third row represents adjusted rand index between (i) true and netNMF-clusters (red), (ii) true and SNF-clusters (blue) and (iii) netNMF-clusters and SNF-clusters (green). Fourth and fifth rows represent the plot of *purity* and *entropy* for netNMF (red) and SNF (blue).
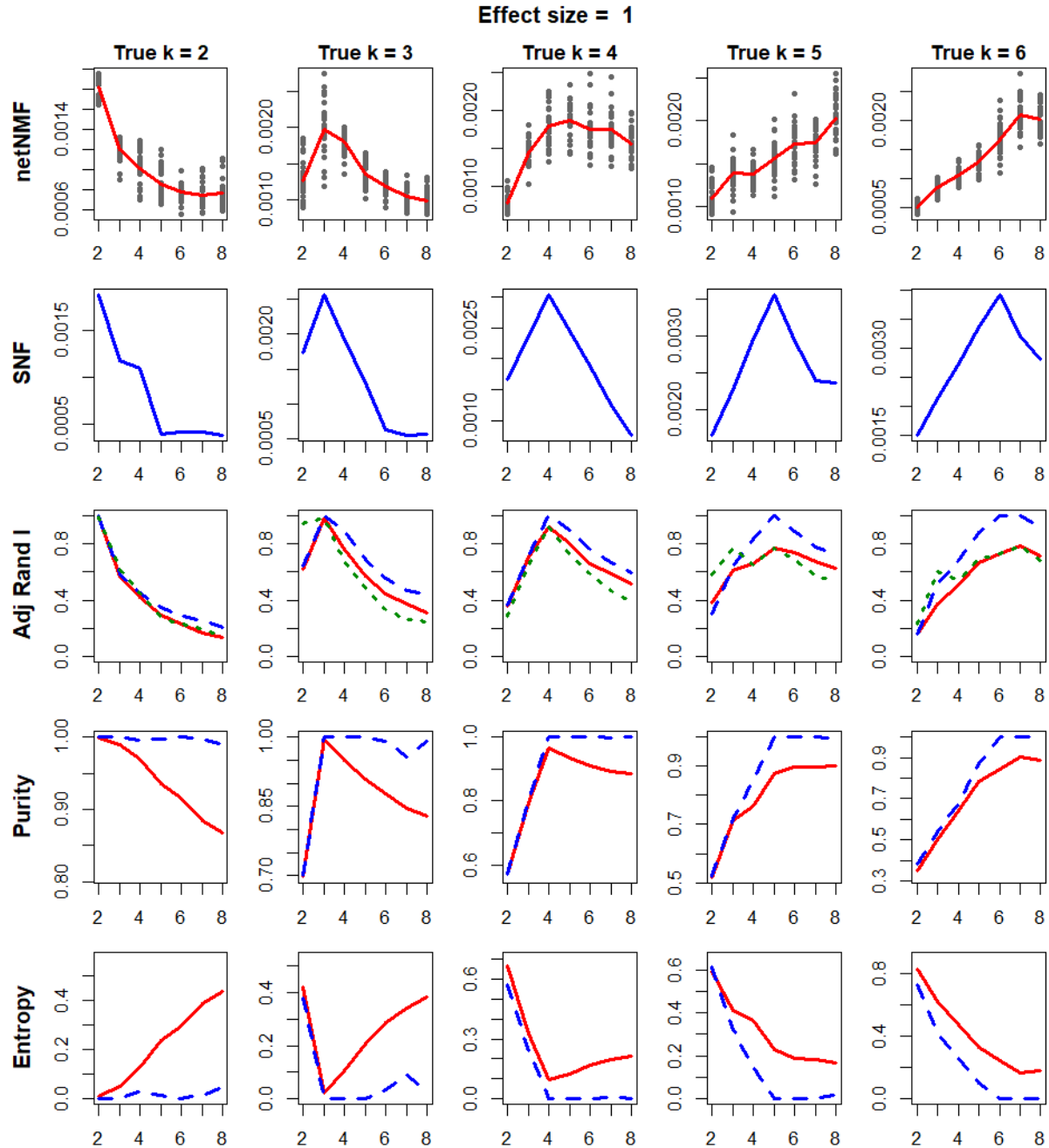
Fig. S30: Comparison of netNMF and SNF over varying k and effect size = 1.0. First row represents the Silhouette width for netNMF, second row represents Silhouette width for SNF method. The third row represents adjusted rand index between (i) true and netNMF-clusters (red), (ii) true and SNF-clusters (blue) and (iii) netNMF-clusters and SNF-clusters (green). Fourth and fifth rows represent the plot of *purity* and *entropy* for netNMF (red) and SNF (blue).
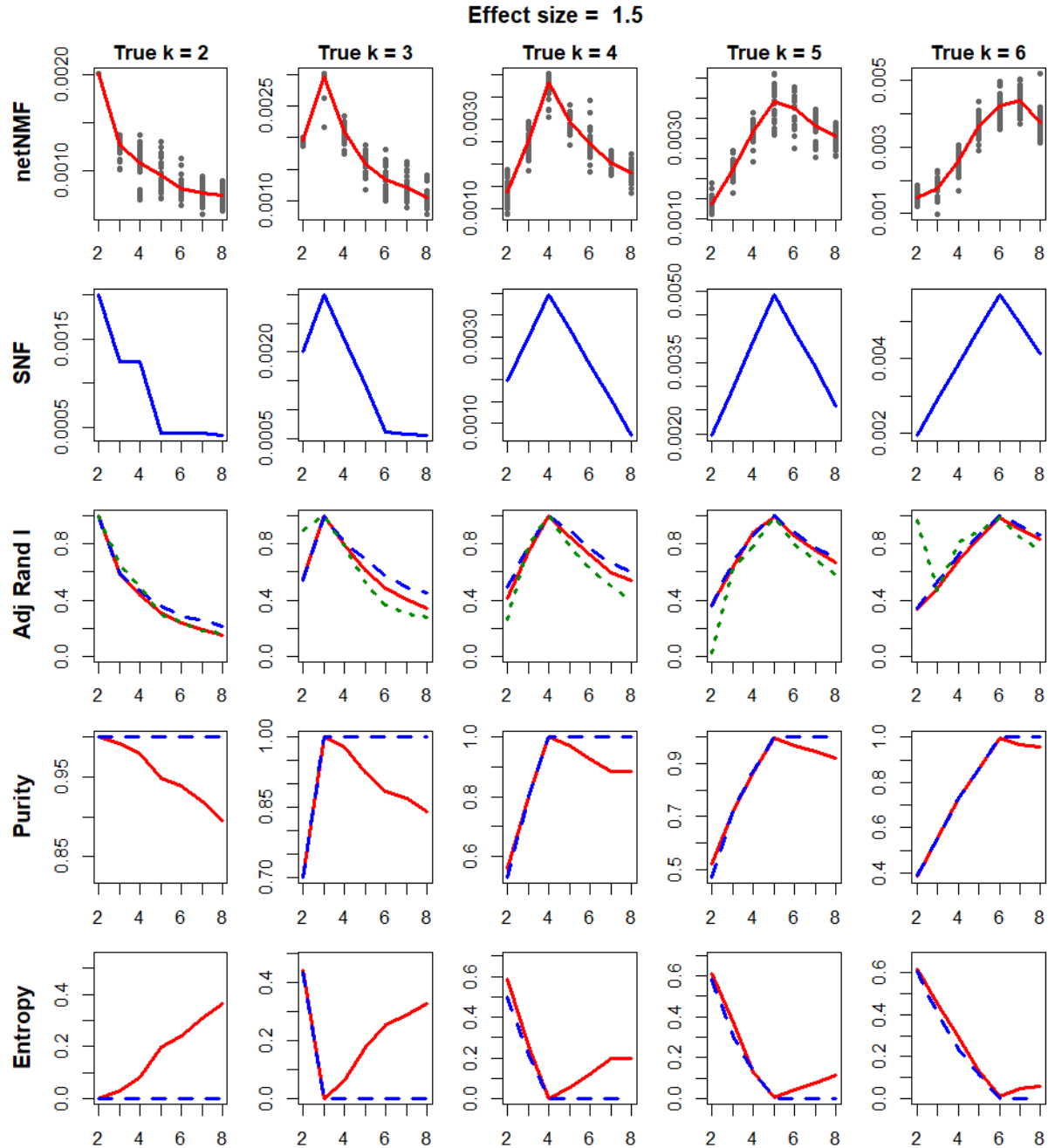
Fig. S31: Comparison of netNMF and SNF over varying k and effect size = 1.5. First row represents the Silhouette width for netNMF, second row represents Silhouette width for SNF method. The third row represents adjusted rand index between (i) true and netNMF-clusters (red), (ii) true and SNF-clusters (blue) and (iii) netNMF-clusters and SNF-clusters (green). Fourth and fifth rows represent the plot of *purity* and *entropy* for netNMF (red) and SNF (blue).
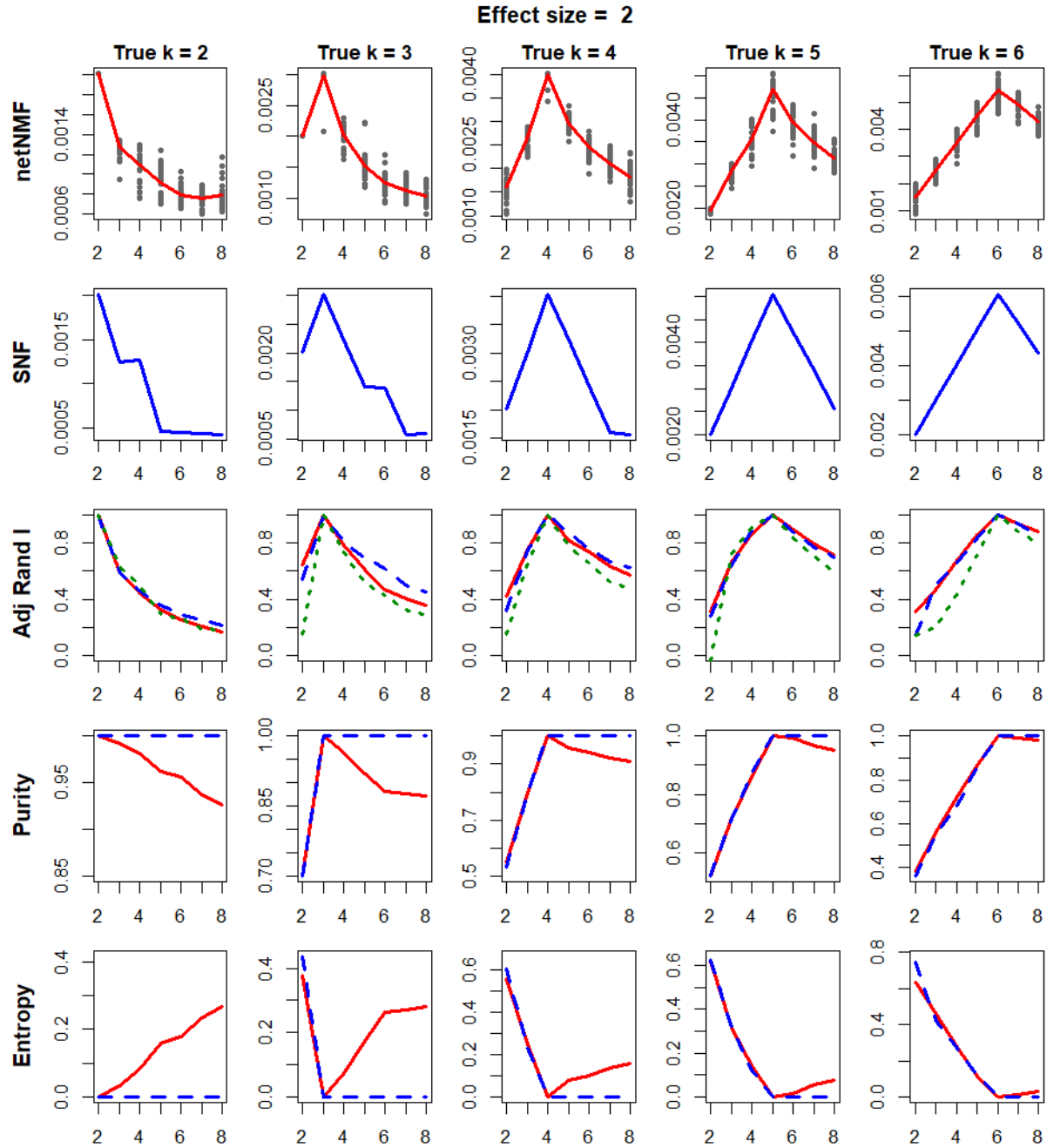
Fig. S32: Comparison of netNMF and SNF over varying k and effect size = 2.0. First row represents the Silhouette width for netNMF, second row represents Silhouette width for SNF method. The third row represents adjusted rand index between (i) true and netNMF-clusters (red), (ii) true and SNF-clusters (blue) and (iii) netNMF-clusters and SNF-clusters (green). Fourth and fifth rows represent the plot of *purity* and *entropy* for netNMF (red) and SNF (blue).
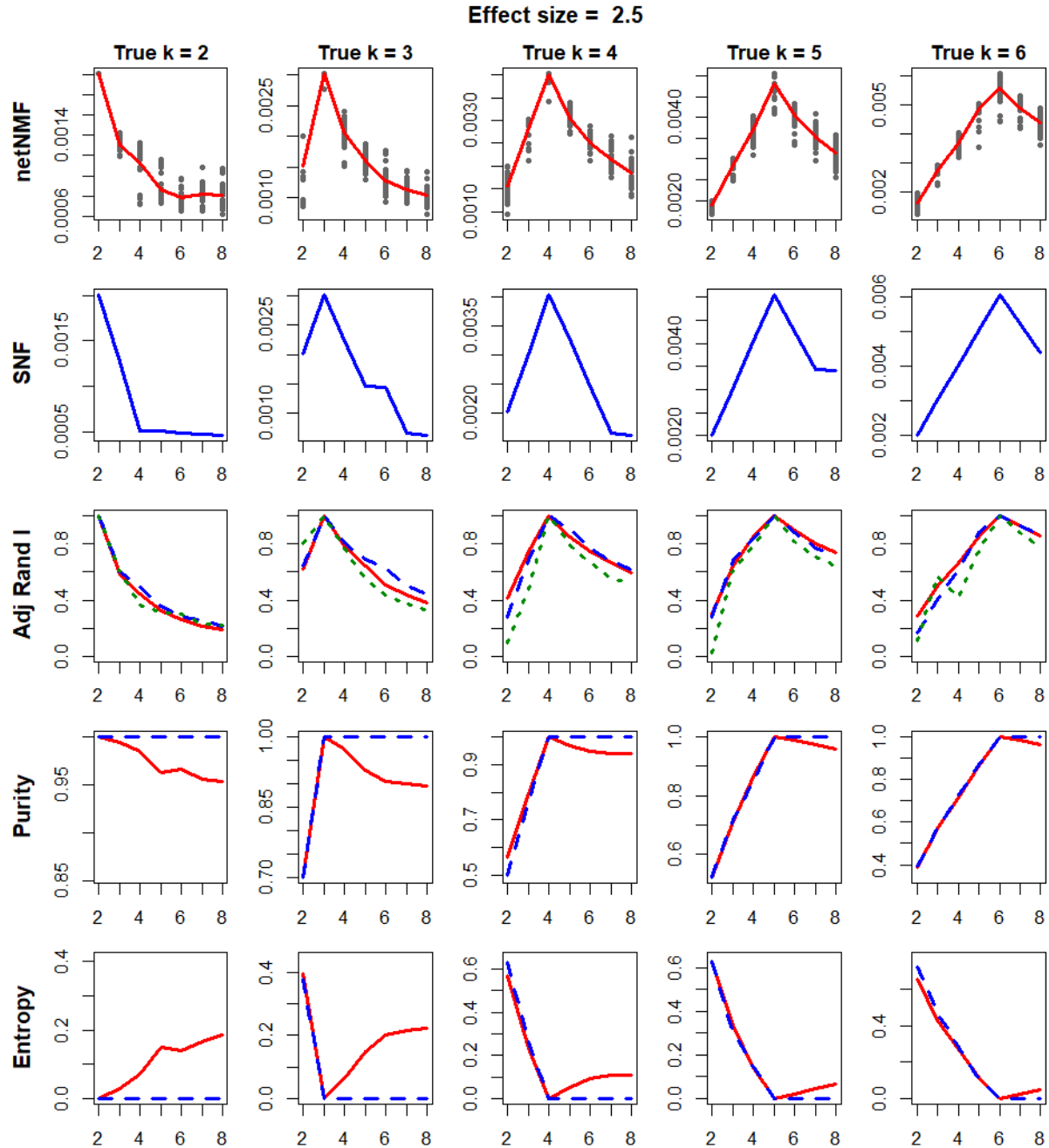
Fig. S33: Comparison of netNMF and SNF over varying k and effect size = 2.5. First row represents the Silhouette width for netNMF, second row represents Silhouette width for SNF method. The third row represents adjusted rand index between (i) true and netNMF-clusters (red), (ii) true and SNF-clusters (blue) and (iii) netNMF-clusters and SNF-clusters (green). Fourth and fifth rows represent the plot of *purity* and *entropy* for netNMF (red) and SNF (blue).
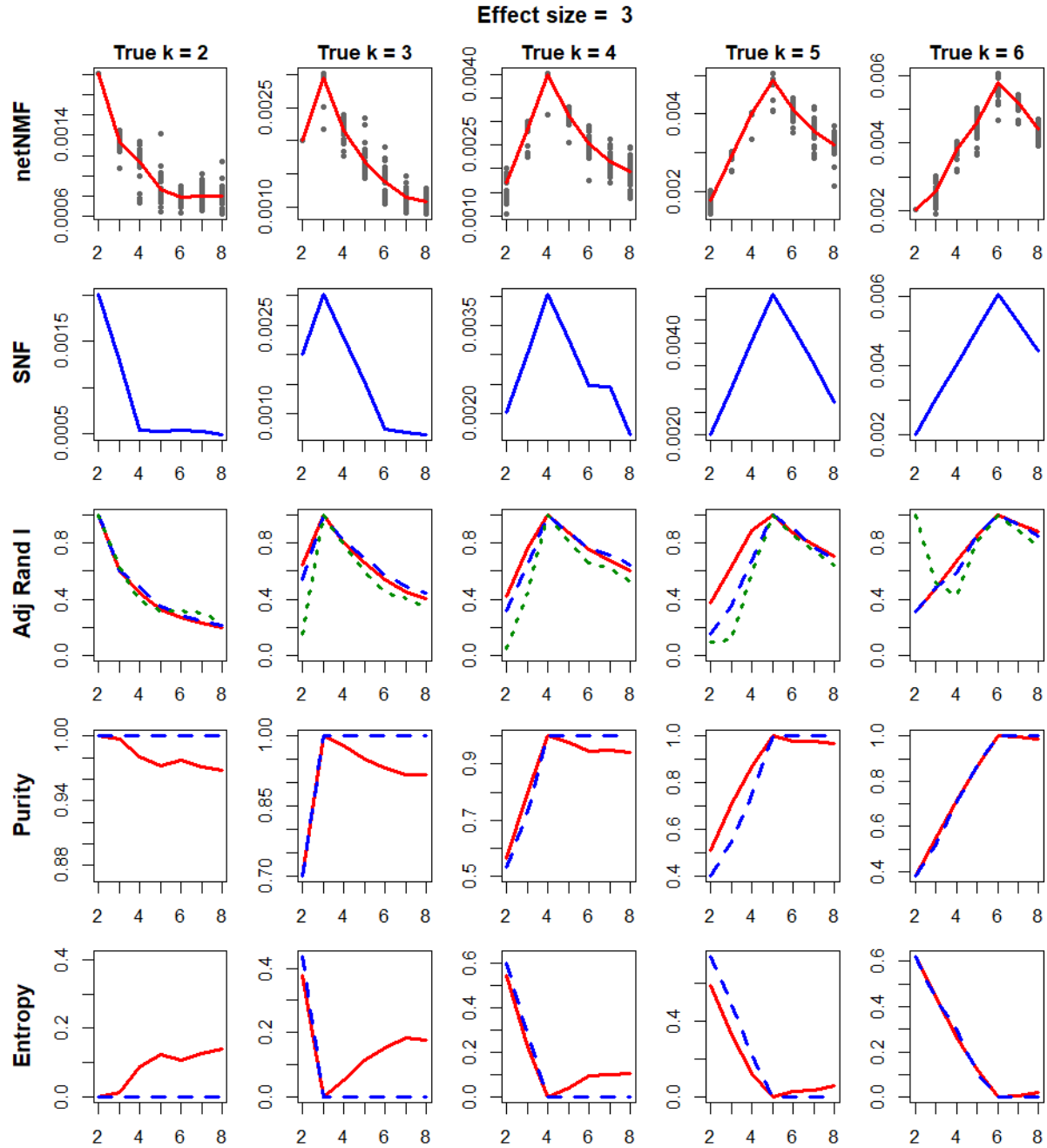
Fig. S34: Comparison of netNMF and SNF over varying k and effect size = 3.0. First row represents the Silhouette width for netNMF, second row represents Silhouette width for SNF method. The third row represents adjusted rand index between (i) true and netNMF-clusters (red), (ii) true and SNF-clusters (blue) and (iii) netNMF-clusters and SNF-clusters (green). Fourth and fifth rows represent the plot of *purity* and *entropy* for netNMF (red) and SNF (blue).
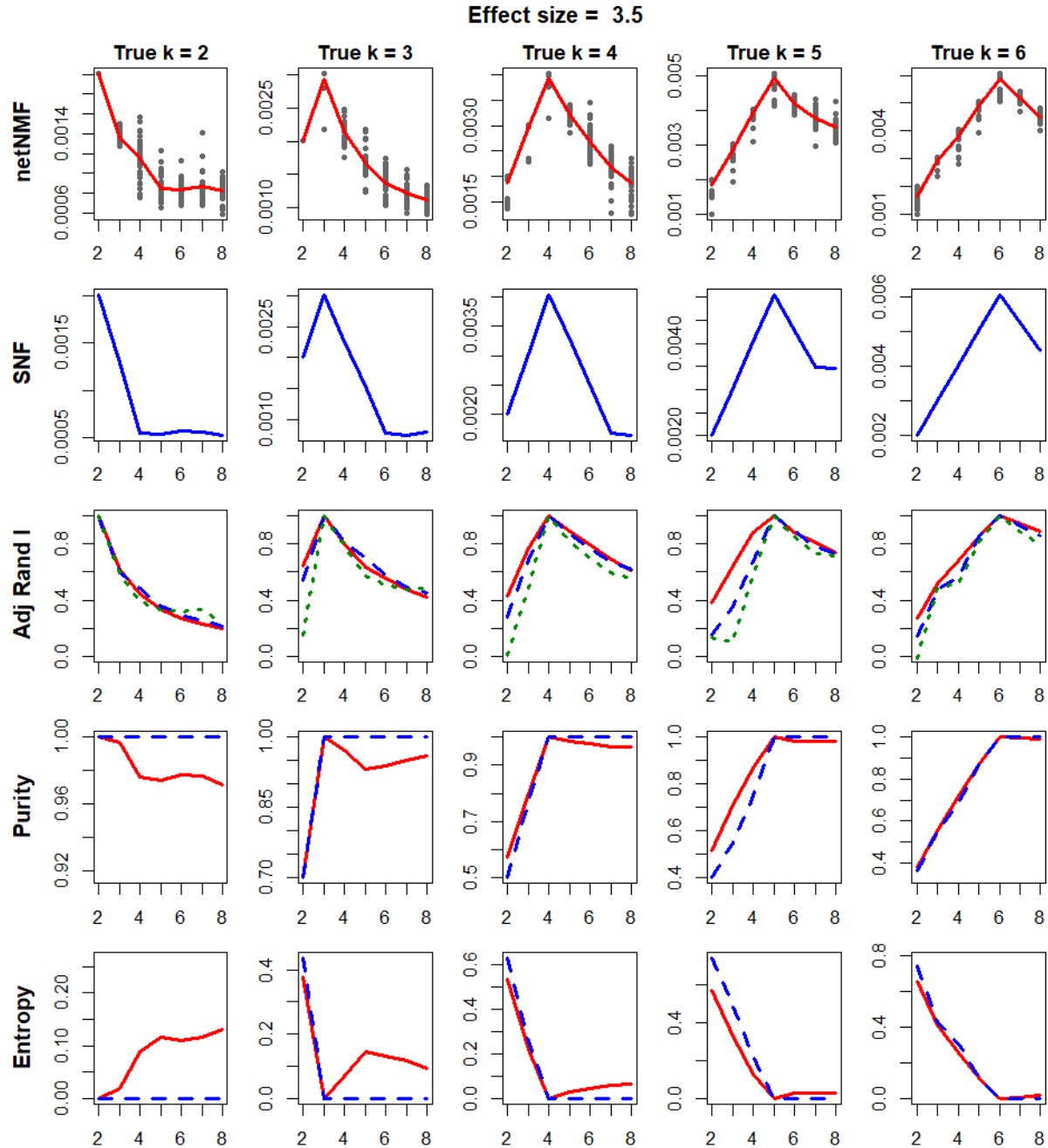
Fig. S35: Comparison of netNMF and SNF over varying k and effect size = 3.5. First row represents the Silhouette width for netNMF, second row represents Silhouette width for SNF method. The third row represents adjusted rand index between (i) true and netNMF-clusters (red), (ii) true and SNF-clusters (blue) and (iii) netNMF-clusters and SNF-clusters (green). Fourth and fifth rows represent the plot of *purity* and *entropy* for netNMF (red) and SNF (blue).
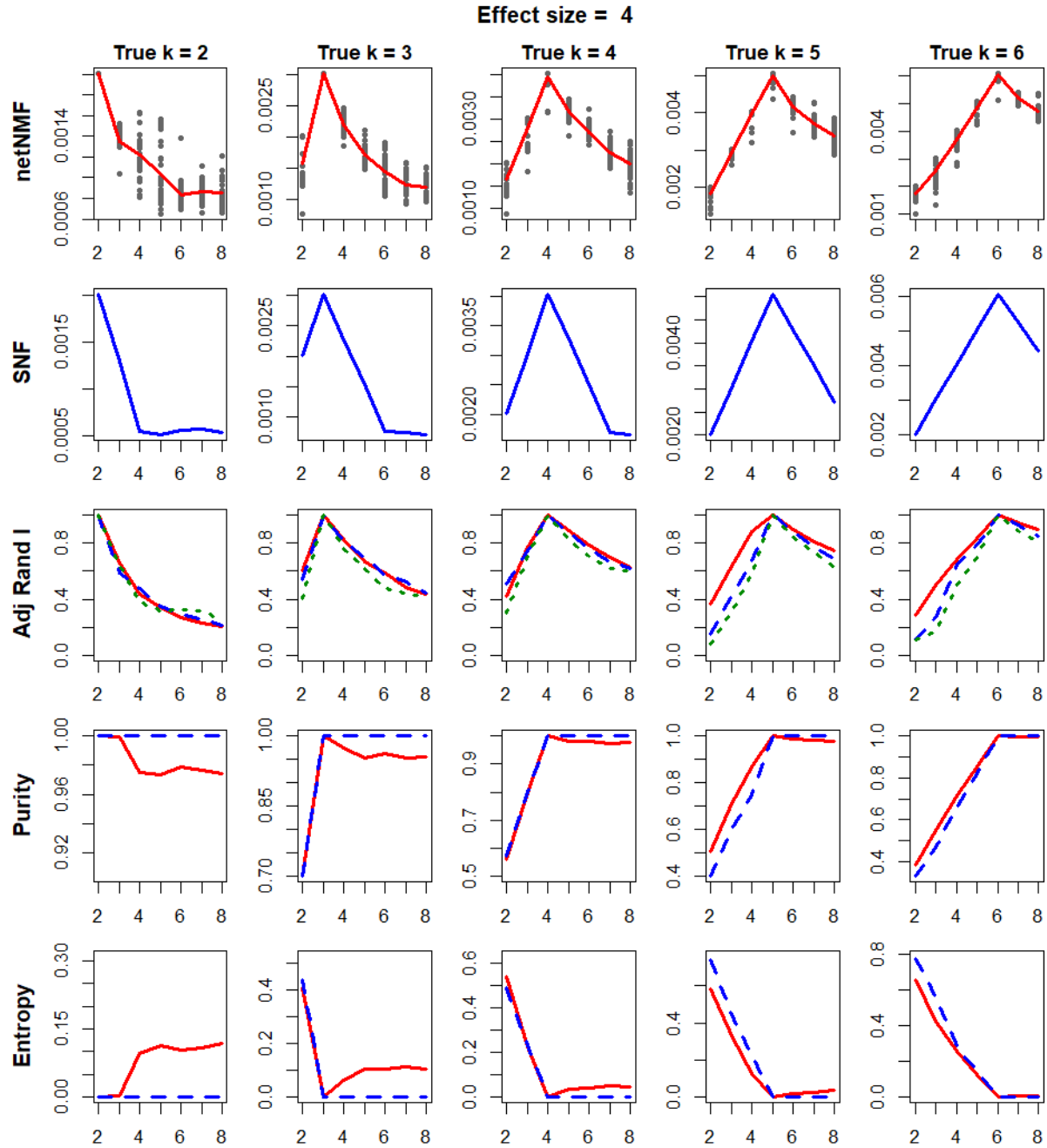
Fig. S36: Comparison of netNMF and SNF over varying k and effect size = 4.0. First row represents the Silhouette width for netNMF, second row represents Silhouette width for SNF method. The third row represents adjusted rand index between (i) true and netNMF-clusters (red), (ii) true and SNF-clusters (blue) and (iii) netNMF-clusters and SNF-clusters (green). Fourth and fifth rows represent the plot of *purity* and *entropy* for netNMF (red) and SNF (blue).
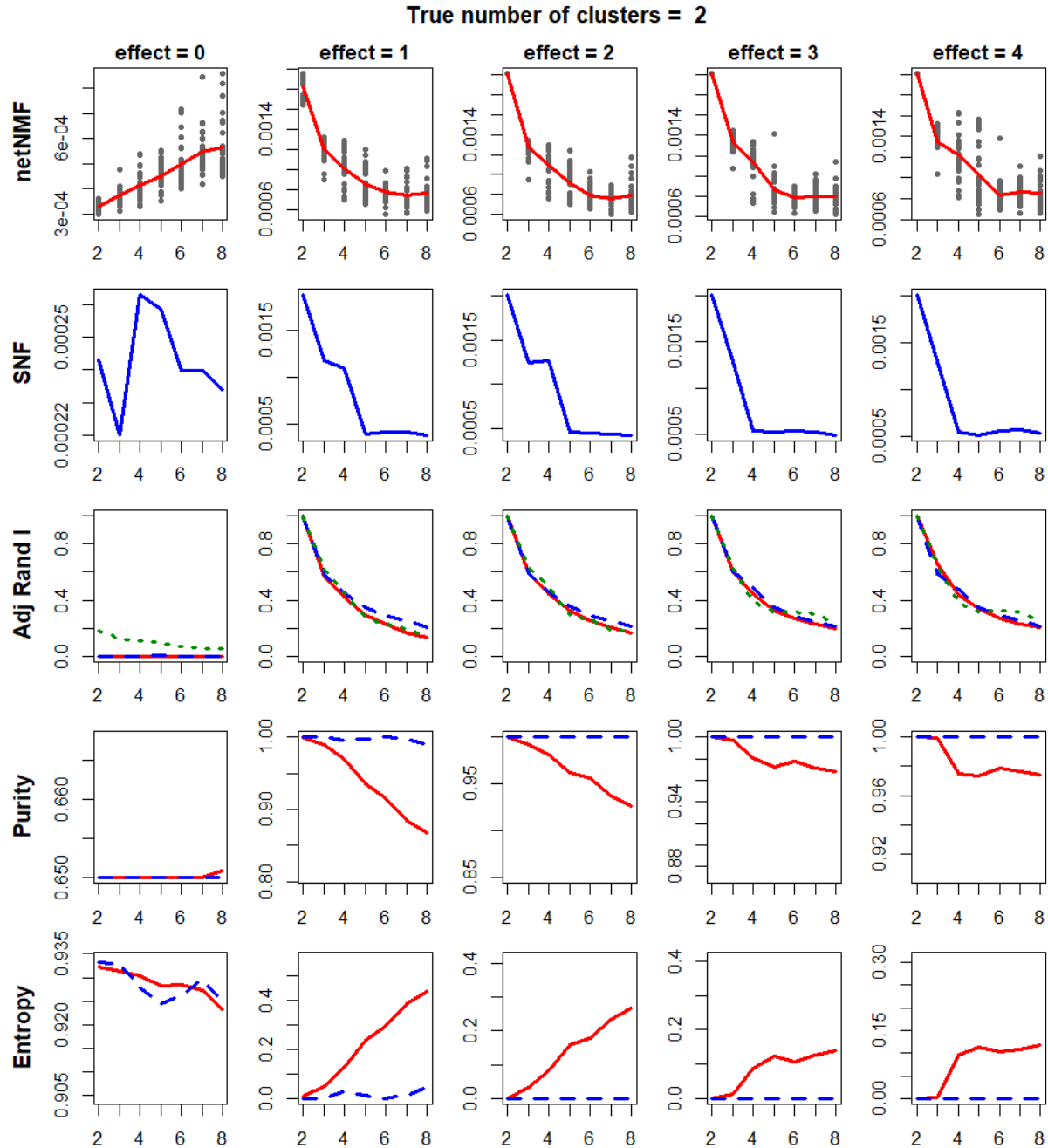
Fig. S37: Comparison of netNMF and SNF over varying effect size and k = 2. First row represents the Silhouette width for netNMF, second row represents Silhouette width for SNF method. The third row represents adjusted rand index between (i) true and netNMF-clusters (red), (ii) true and SNF-clusters (blue) and (iii) netNMF-clusters and SNF-clusters (green). Fourth and fifth rows represent the plot of *purity* and *entropy* for netNMF (red) and SNF (blue).
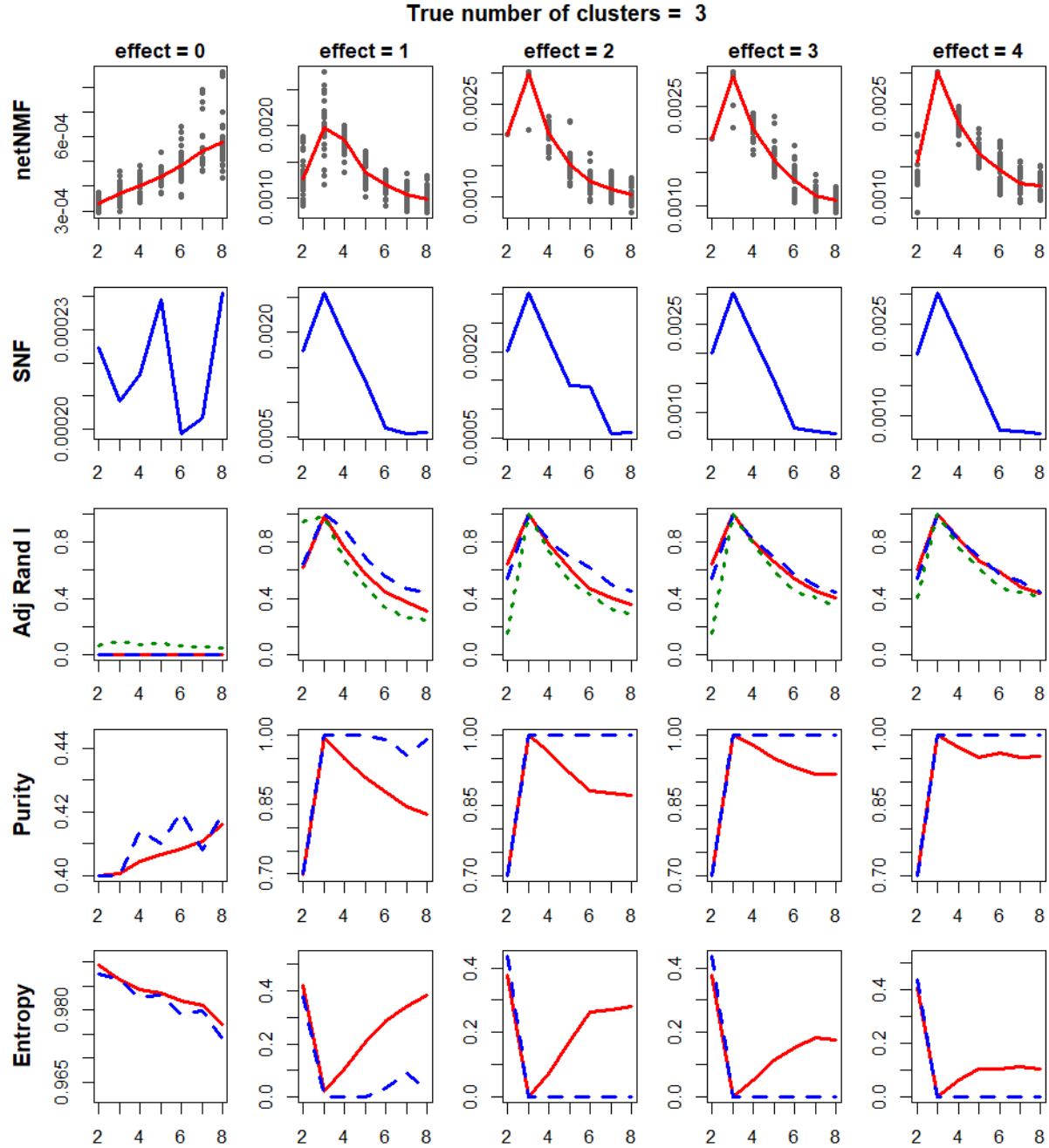
Fig. S38: Comparison of netNMF and SNF over varying effect size and k = 3. First row represents the Silhouette width for netNMF, second row represents Silhouette width for SNF method. The third row represents adjusted rand index between (i) true and netNMF-clusters (red), (ii) true and SNF-clusters (blue) and (iii) netNMF-clusters and SNF-clusters (green). Fourth and fifth rows represent the plot of *purity* and *entropy* for netNMF (red) and SNF (blue).
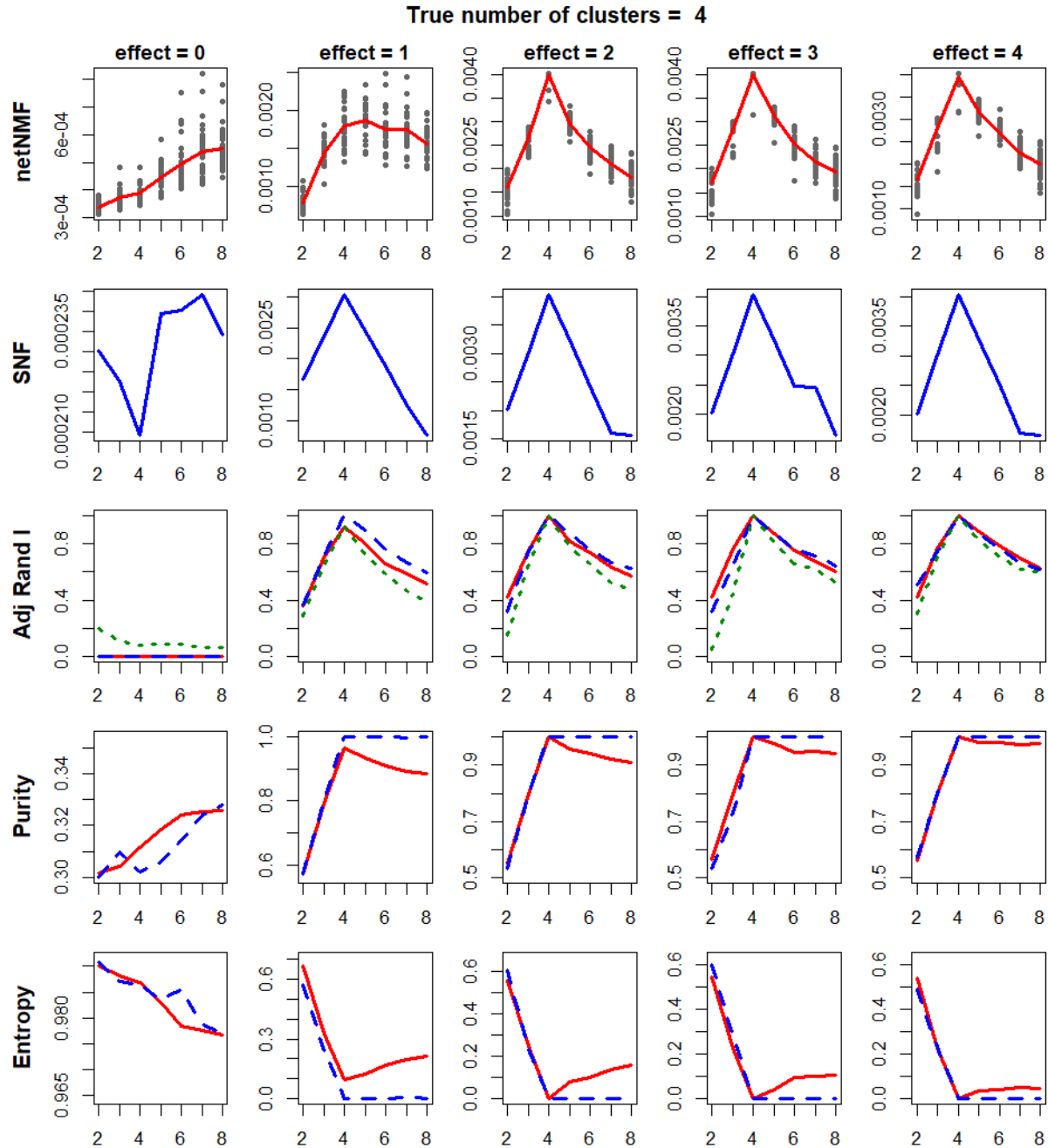
Fig. S39: Comparison of netNMF and SNF over varying effect size and k = 4. First row represents the Silhouette width for netNMF, second row represents Silhouette width for SNF method. The third row represents adjusted rand index between (i) true and netNMF-clusters (red), (ii) true and SNF-clusters (blue) and (iii) netNMF-clusters and SNF-clusters (green). Fourth and fifth rows represent the plot of *purity* and *entropy* for netNMF (red) and SNF (blue).
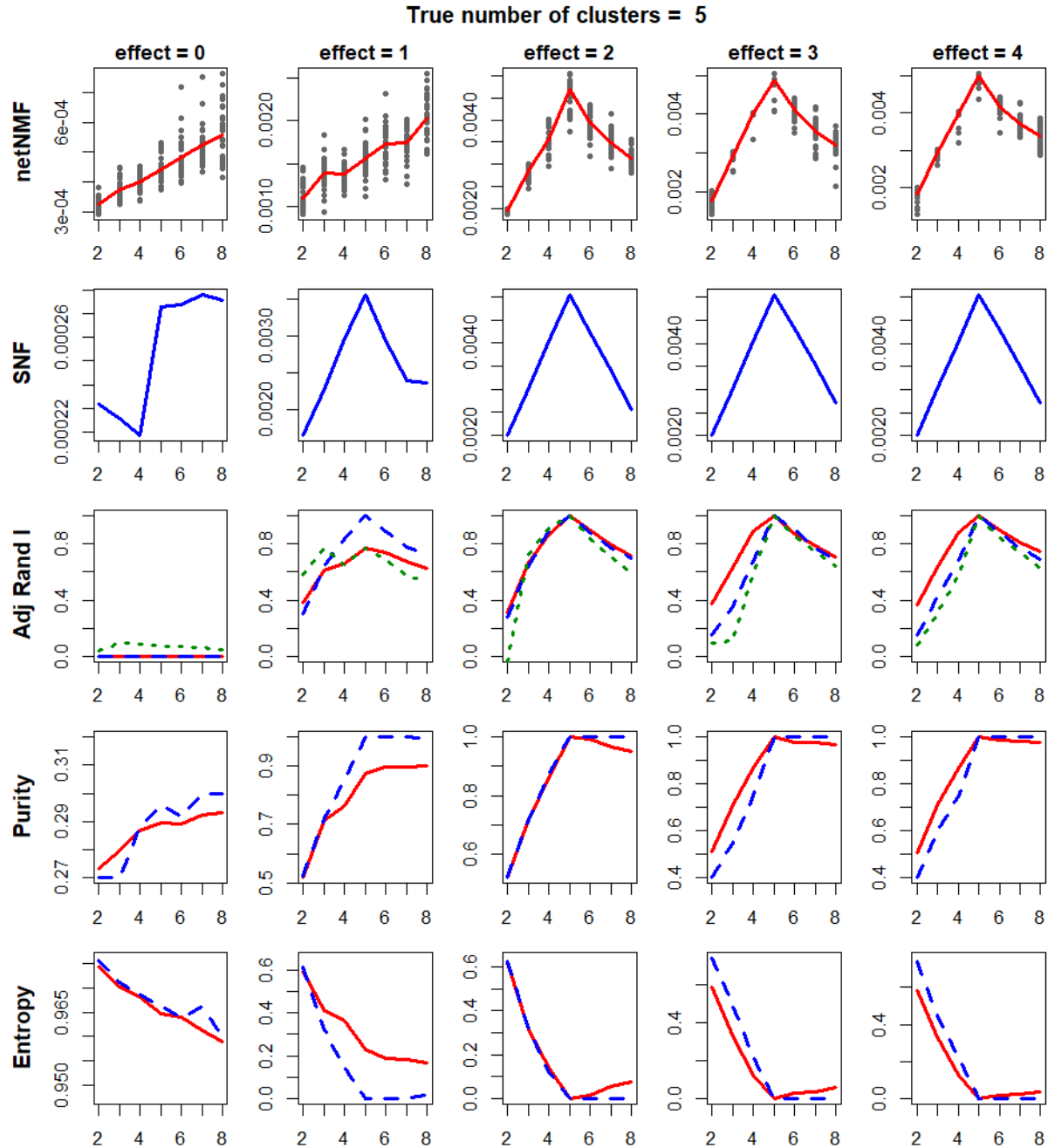
Fig. S40: Comparison of netNMF and SNF over varying effect size and k = 5. First row represents the Silhouette width for netNMF, second row represents Silhouette width for SNF method. The third row represents adjusted rand index between (i) true and netNMF-clusters (red), (ii) true and SNF-clusters (blue) and (iii) netNMF-clusters and SNF-clusters (green). Fourth and fifth rows represent the plot of *purity* and *entropy* for netNMF (red) and SNF (blue).
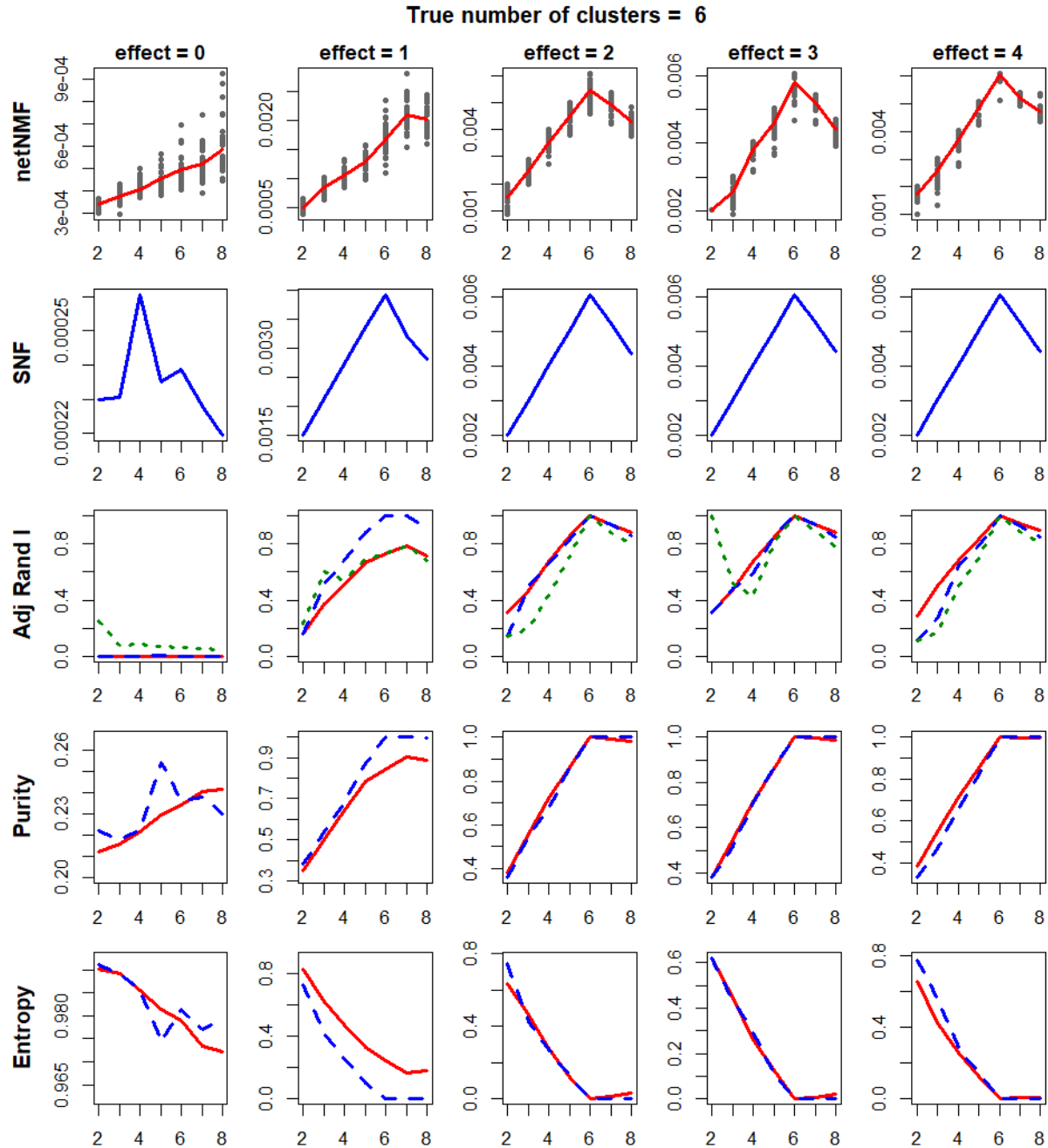
Fig. S41: Comparison of netNMF and SNF over varying effect size and k = 6. First row represents the Silhouette width for netNMF, second row represents Silhouette width for SNF method. The third row represents adjusted rand index between (i) true and netNMF-clusters (red), (ii) true and SNF-clusters (blue) and (iii) netNMF-clusters and SNF-clusters (green). Fourth and fifth rows represent the plot of *purity* and *entropy* for netNMF (red) and SNF (blue).