MCMC sampling of (connectivity restrained) directed flag complexes

Florian Unger Jonathan Krebs

TU Graz

FAU Erlangen

April 2022

▲□▶ ▲□▶ ▲ 三▶ ▲ 三▶ 三 のへぐ



Figure: Random Walk in $\mathcal G$

・ロト ・ 日 ト ・ 日 ト ・

æ

ъ

Complex Moves (1)



Figure: A demonstration of Clique Permute: The graph on the left exhibits the 4-simplices [0, 1, 2, 3, 4] and [0, 1, 3, 2, 4] over the same set of vertices. The application of Clique Permute with the permututation $\pi = (2, 4, 0, 3, 1)$ leads to the corresponding cliques [1, 3, 2, 4, 0] and [1, 3, 4, 2, 0]. Small gray points and lines represent the graph outside of this clique, their respective connections are not modified.

Complex Moves (2)



Figure: Clique Swap: Here single edges are omitted for simplicity. On the left hand side we observe two 5-cliques with differing number of double edges. Clique Swap now swaps (via the bijection $(0, 1, 2, 3, 4) \mapsto (D, C, B, E, A)$) all the edges from the upper clique to the lower clique and vice versa. The remaining graph and their edges to these cliques remain untouched.

Results



▲□▶ ▲□▶ ▲□▶ ▲□▶ ▲□▶ ▲□ ● ● ● ●

Results



▲□▶ ▲□▶ ▲三▶ ▲三▶ 三三 - のへで

Results



▲□▶ ▲圖▶ ▲国▶ ▲国▶ 三国 - のへで