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Continuous-Time Quantum Walks on Windmill Graphs

Let A be the adjacency matrix of a graph. We will associate this graph with a continuous-time quantum walk by using a transition matrix $U(t) = e^{itA}$. This allows us to create another matrix $\hat{M}$ which is time-independent. $\hat{M}$ gives us some measure of average probability values of a continuous time quantum walk and is called the average mixing matrix. This has been studied extensively on trees and other graphs with distinct eigenvalues.

Our work focuses on graphs which have repeated eigenvalues. In addition to studying the rank and long-term behavior of Dutch Windmill graphs, we extended that same study to French Windmill graphs and Kulli Cycle Windmills. We will compare the behavior of the Windmill graphs to see which ones allow greater transfer of quantum information.