

Graphs, Hilbert spaces and operator algebras

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There is a long tradition of representing algebraic objects by operators on Hilbert space: one represents groups by unitary operators, and semigroups by isometries. More recently, it has been shown that one can profitably model directed graphs by families of partial isometries on Hilbert space, in such a way that the path structure of the graph is reflected in the algebraic structure of the operator algebra generated by the partial isometries. These algebras are called Cuntz-Krieger algebras, and have previously arisen in topological dynamics. The graph-theoretic interpretation, and in particular the need to accommodate infinite graphs, has suggested some useful extensions of the theory of Cuntz-Krieger algebras, and many of the key theorems have particularly elegant graph-theoretic formulations. In this talk we shall discuss some of these theorems, and illustrate them liberally with interesting examples.