GROUPOIDS AND MULTI-RESOLUTION ANALYSIS

MARIUS IONESCU

ABSTRACT. This presentation is based on joint work with Paul S. Muhly. The main goal of our work is the relationship between groupoids, multi-resolution analysis (MRA) and wavelets. Our work is a sequel to an older paper of us in which we showed how groupoids can be used to provide a functorial perspective to the set-up of many known results about MRAs and wavelets in the literature. The current project uses pullback of groupoids and limits of such pullbacks to construct what we called proto-multiresolution analysis. We show that virtually all results in the literature of operator theory and wavelets can be obtained from our set-up by applying appropriate representations of a specific groupoid, the Deaconu-Renault groupoid, to these proto-multiresolution analyses. We build new examples of wavelets from local homeomorpshisms such as Blaschke products, extending significantly the known examples in the literature.