REPRESENTATION UP TO HOMOTOPY OF LIE GROUPOIDS

Abstract. Lie groupoids can be considered as a categorification of both smooth manifolds and Lie groups. In the latter's point of view, given a Lie groupoid $[\mathbb{X}\colon X_1 \rightrightarrows X_0]$, one can associate a Lie algebroid as $A = 1^*\ker \mathrm{ds} \to \mathrm{X}_0$. The above correspondence differs significantly from the classical correspondence between Lie groups and Lie algebras. For instance, a Lie groupoid does not admit an adjoint representation on its associated Lie algebroid in general. Crainic and Abad have addressed the above issue by introducing a notion of representation up to homotopy for Lie groupoids. Indeed, after reviewing the notion of representation up to homotopy of Lie groupoids, we show that equipping an Ehresmann connection on $[\mathbb{X}\colon X_1 \rightrightarrows X_0]$ defines an adjoint representation on the graded vector bundle $A \oplus TX_0$ as a representation up to homotopy.