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GROUPOIDS, BRANCHED MANIFOLDS AND MULTISECTIONS

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Cieliebak *et al.* recently formulated a definition of branched submanifold of Euclidean space in connection with their discussion of multivalued sections and the Euler class. This note proposes an intrinsic definition of a weighted branched manifold $\underline{\boldsymbol{Z}}$ that is obtained from the usual definition of oriented orbifold groupoid by relaxing the properness condition and adding a weighting. We show that if $\underline{\boldsymbol{Z}}$ is compact, finite dimensional and oriented, then it carries a fundamental class $[\boldsymbol{Z}]$. Adapting a construction of Liu and Tian, we also show that the fundamental class $[\boldsymbol{X}]$ of any oriented orbifold $\underline{\boldsymbol{X}}$ may be represented by a map $\underline{\boldsymbol{Z}} \to \underline{\boldsymbol{X}}$, where the branched manifold $\underline{\boldsymbol{Z}}$ is unique up to a natural equivalence relation. This gives further insight into the structure of the virtual moduli cycle in the new polyfold theory recently constructed by Hofer *et al.*

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