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Hausdorffization of the space of equivalence classes

Let X and M are connected and locally path connected Hausdorff topological spaces (so they are path connected) and let $F: X \to M$ be a continuous mapping such that for every $x \in M$ the set $F^{-1}(x)$ is locally path connected. We introduce on X an equivalence relation: $x \sim y$ if x and y belong to the same connected component of $F^{-1}(x)$ and denote the quotient $X/\sim$ by X_F endowed with the quotient topology. In general, the space X_F need not to be Hausdorff even in simple situations. For example, let X be the strip $\{(x,y): -2 \leq y \leq 2\}$ in the plane with the ray $\{x \geq 0, y = 0\}$ cut out, M is the x-axis and $F(x,y) = x$.

There are several examples, pertinent to complex analysis, where X_F is seemingly non-Hausdorff. In our talk we will describe an algorithm that reduces X_F to a Hausdorff space without the loss of information and demonstrate how it can be applied to known examples.