analytic space

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A Hausdorff topological space X is said to be an *analytic space* if:

1. There exists a countable number of open sets V_j covering X.

2. For each V_j there exists a homeomorphism $\varphi_j \colon Y_j \to V_j$, where Y_j is a local complex analytic subvariety in some $\mathbb{C}^n$.

3. If V_j and V_k overlap, then $\varphi_j^{-1} \circ \varphi_k$ is a biholomorphism.

Usually one attaches to X a set of coordinate systems $\mathcal{G}$, which is a set (now uncountable) of triples $(V_\iota, \varphi_\iota, Y_\iota)$ as above, such that whenever V is an open set, Y a local complex analytic subvariety, and a homeomorphism $\varphi \colon Y \to V$, such that $\varphi_\iota^{-1} \circ \varphi$ is a biholomorphism for some $(V_\iota, \varphi_\iota, Y_\iota) \in \mathcal{G}$ then $(V, \varphi, Y) \in \mathcal{G}$. Basically $\mathcal{G}$ is the set of all possible coordinate systems for X.

We can also define the singular set of an analytic space. A point p is if there exists (at least one) a coordinate system $(V_\iota, \varphi_\iota, Y_\iota) \in \mathcal{G}$ with $p \in V_\iota$ and Y_ι a complex manifold. All other points are the singular points.

Any local complex analytic subvariety is an analytic space, so this is a natural generalization of the concept of a subvariety.

References

[1] Hassler Whitney. . Addison-Wesley, Philippines, 1972.