This is a preliminary report on joint work with Anders Björner and Robert MacPherson. The complexity of a Boolean function $F : \{0, 1\}^n \to \{0, 1\}$ can be measured by the size of a binary circuit (with $n$ inputs) that produces the function. There are $2^{2^n}$ different Boolean functions which implies that most functions have exponential circuit complexity. And yet, no explicit sequence of functions is known with circuit complexity greater than $n^3$. In an effort to study this phenomenon we suggest several ways to associate a topological space $X(F)$ to each Boolean function, with the hopes that the size of the homology $H_*(X(F))$ may provide a handle on the complexity of $F$. (Received September 05, 2015)