Abstract: We review known and state some new results on homotopy nilpotency and co-nilpotency of spaces. Next, we take up the systematic study of homotopy nilpotency of homogenous spaces G/K for a Lie group G and its closed subgroup $K < G$. Then, the homotopy nilpotency of the loop spaces $\Omega(G_{n,m}(\mathbb{K}))$ and $\Omega(V_{n,m}(\mathbb{K}))$ of Grassmann $G_{n,m}(\mathbb{K})$ and Stiefel $V_{n,m}(\mathbb{K})$ manifolds for $\mathbb{K} = \mathbb{R}$, $\mathbb{C}$, the field of reals or complex numbers and $\mathbb{H}$, the skew $\mathbb{R}$-algebra of quaternions is investigated.