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On an induced version of Menger's theorem

Menger's theorem is one of the most fundamental results in graph theory: if G is a graph, either $A, B \subseteq V(G)$ can be separated by removing fewer than k vertices, or there exists k pairwise disjoint A-B paths. What happens if we wish these paths to not only be disjoint, but non-adjacent? This question, while interesting in its own right, is also motivated by the *Coarse Graph Theory* recently proposed by Georgakopoulos and Papasoglu. We show the existence of a constant C, which depends only on the maximum degree of G, such that either A, B can be separated by removing at most Ck vertices, or there exists k pairwise non-adjacent A-B paths. A generalization of this result to graphs with a forbidden topological minor will also be discussed, as well as more precise results for the subcubic case. Joint work with Kevin Hendrey, Sergey Norin and Raphael Steiner.