Summary: The $k$-Path problem asks whether a given undirected graph has a (simple) path of length $k$. We prove that $k$-PATH has polynomial-size Turing kernels when restricted to planar graphs, graphs of bounded degree, claw-free graphs, or to $K_{3,t}$-minor-free graphs. This means that there is an algorithm that, given a $k$-PATH instance $(G, k)$ belonging to one of these graph classes, computes its answer in polynomial time when given access to an oracle that solves $k$-PATH instances of size polynomial in $k$ in a single step. Our techniques also apply to $k$-Cycle, which asks for a cycle of length at least $k$.

MSC:

68Q25 Analysis of algorithms and problem complexity
05C38 Paths and cycles

Keywords:

parameterized complexity; Turing kernelization; $k$-Path; preprocessing

Software:

Algorithm 447

Full Text: DOI arXiv

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