Fixed point theorems for maps with various local contraction properties

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Let $\langle X, d \rangle$ be a metric space. A function $f : X \to X$ is *locally contractive* (resp. *locally shrinking*) if for every $x \in X$ there exists $\epsilon_x > 0$ and $\lambda_x \in [0, 1)$ such that $d(f(y_1), f(y_2)) \le \lambda_x d(y_1, y_2)$ (resp. $d(f(y_1), f(y_2)) < d(y_1, y_2)$) for all distinct $y_1, y_2 \in B(x, \epsilon_x)$. Functions with similar properties are known to have fixed or periodic points for spaces X with certain topological properties (e.g., compactness, connectedness and other). We discuss classic and recently proved fixed/periodic point theorems for several different classes of locally contractive / shrinking functions defined on a variety of metric spaces.

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