Poster presentation: Besicovitch-Federer projection theorem for $\mathscr{C}^1(\mathbb{R}^n, \mathbb{R}^n)$ maps with constant rank of the Jacobian matrix

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We prove a generalisation of the *Besicovitch-Federer projection theorem*(BF theorem) about a characterisation of rectifiable and unrectifiable sets in terms of their projections. In the part about unrectifiable sets, the usual BF theorem states that the $\mathscr{H}^m$ measure of a generic orthogonal projection of an m-unrectifiable set Σ onto an m-dimensional plane is equal to zero.

In our theorem we replace orthogonal projection with a continuously differentiable function with constant rank of derivative. For an m-unrectifiable set $\Sigma \subset \mathbb{R}^n$ having finite Hausdorff measure and $\varepsilon > 0$, we prove that for a mapping $f \in \mathscr{C}^1(U, \mathbb{R}^n)$ having constant, equal to m, rank of the Jacobian matrix there exists a mapping f_ε whose rank of the Jacobian matrix is also constant, equal to m, such that

$$\|f - f_\varepsilon\|_{\mathscr{C}^1} < \varepsilon$$

and

$$\mathscr{H}^m(f_\varepsilon(\Sigma)) = 0.$$