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Proof mining in $CAT(0)$-spaces and $\mathbb{R}$-trees.

By *proof mining* we understand developing logical tools (more specifically proof theoretic techniques) which systematically transform ineffective proofs of mathematical theorems in such a way that explicit quantitative data, e.g. effective uniform bounds, are extracted, which were not visible beforehand.

General logical metatheorems were proved by Kohlenbach and Gerhardy/Kohlenbach for various classes of spaces in functional analysis and metric geometry. These metatheorems guarantee a priorly, under very general logical conditions, the extractability of effective bounds from large classes of proofs and moreover they provide algorithms for actually extracting the bounds.

In this talk we present adaptations of the existing metatheorems to other important classes of spaces: $\mathbb{R}$-*trees* and *uniformly convex hyperbolic spaces*. We also give recent applications of proof mining in $CAT(0)$-spaces and $\mathbb{R}$-trees. One such application is in metric fixed-point theory of nonexpansive mappings. Thus, we obtain a quadratic bound on the rate of asymptotic regularity for the Krasnoselski-Mann iterations of nonexpansive mappings in CAT(0)-spaces and $\mathbb{R}$-trees, whereas previous results guarantee only exponential bounds. (Received September 25, 2006)