
Exposure-Normalized Bicycle Crash Risk Along Berlin Routes

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Abstract

We plan to investigate route-level bicycle crash risk in Berlin by addressing a key limitation in current safety analyses: raw crash counts don't distinguish between dangerous roads and simply busy roads. Our approach will combine police-recorded crash data from the German Unfallatlas with recent city-wide traffic volume estimates to calculate a normalized risk metric at the street-segment level. We aim to estimate this risk conditional on contextual factors (e.g., time of day and weather) to capture temporal variability. The core idea is to identify which segments have high crash rates per cyclist rather than just high absolute crash numbers. We will then explore how to aggregate these segment-level risks into route-level scores that could inform safer cycling navigation. Building on this, we aim to score a user-specified route and, where possible, recommend alternative routes with lower estimated risk while maintaining comparable convenience (e.g., distance or travel time).

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