SYMBOLS AND TIME INHOMOGENEOUS PROCESSES

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For different classes of stochastic processes (e.g. Lévy-, Feller-, and Itô-processes) we define the (probabilistic) symbol \( q \) via

\[
q(x, \xi) := -\lim_{t \searrow 0} \frac{E_x e^{i(\tilde{X}^\sigma_t - s)\cdot \xi} - 1}{t}
\]

for \( \xi \in \mathbb{R}^d \) where \( \sigma = \sigma_x^K \) is the first exit time from a compact neighborhood \( K := K_x \) of \( x \). The symbol was used to define generalized Blumenthal-Getoor-indices to derive, e.g. upper and lower bounds for the Hausdorff dimension of the range of the process, as well as for the Hölder continuity (from the right) and the \( \gamma \)-variation of the trajectories.

Until now, all considered classes of processes are Markovian semimartingales and homogeneous in time. The canonical way to deal with time inhomogeneous processes is to consider the space-time process \( \tilde{X} \) where \( X \) is a time homogeneous process.

This approach has a big disadvantage: All known generalized Blumenthal–Getoor-indices \( \beta \) fulfill \( \beta(\tilde{X}) \geq 1 \) and in many cases we only get quite bad bounds. In this poster, we want to give a first idea on how to generalize previous results for the time inhomogenous case in order to get better bounds in the future.

References