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DIMENSION RESULTS RELATED TO THE ST. PETERSBURG GAME

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Abstract: Let S_n be the total gain in n repeated St. Petersburg games. It is known that $n^{-1}(S_n - n\log_2 n)$ converges in distribution along certain geometrically increasing subsequences and its possible limiting random variables can be parametrized as $Y(t)$ with $t \in \left[\frac{1}{2}, 1\right]$. We determine the Hausdorff and box-counting dimension of the range and the graph for almost all sample paths of the stochastic process $\{Y(t)\}_{t\in[1/2,1]}$. The results are compared to the fractal dimension of the corresponding limiting objects when gains are given by a deterministic sequence initiated by Hugo Steinhaus.

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