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Measures and matching for number systems

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Stellingen

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Measures and Matching for Number Systems

van

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1. Each random c-Lüroth map $L_{c,p}$ produces by iteration generalised c-Lüroth expansions of numbers in the interval $[c, 1]$. If $c = 0$ or $c = \frac{1}{\ell}$ for an integer $\ell \geq 3$, then Lebesgue almost all points of $[c, 1]$ have uncountably many generalised Lüroth expansions, which are universal.

   [Chapter 2]

2. The Hamming weight of a typical signed binary expansion, produced by any of the random symmetric doubling maps R_α, is at least $1/2$. The value can be decreased to $1/3$ in specific cases.

   [Chapter 5]

3. For a class of random affine expanding interval systems, all invariant densities of their stationary measures can be explicitly constructed through the non-trivial solutions of a homogeneous matrix equation.

   [Chapter 3]

4. The computation of the fundamental matrix of a random system T becomes quite straightforward if T is a Markov random map and/or T presents the random matching property.

   [Chapter 3 and 5]

5. The parameter space of specific families of interval maps with finite measure breaks down into maximal intervals of constant matching exponents. This is also proved to be the case for the family of flipped α-continued fraction maps admitting an infinite measure.

   [Chapter 4]

6. As in the deterministic setting, the property of random matching, for random expanding maps with a fundamental matrix, implies that the density of any stationary measure is a simple function (i.e., it is piecewise constant).

   [Chapter 5]

7. The advantage of considering random interval systems is that a single random map produces many more number expansions per point than a deterministic one, allowing the study of the properties of very many expansions simultaneously.

   [Chapter 2, 3 and 5]

8. Birkhoff's Ergodic Theorem is a very powerful tool in the study of number systems for which an explicit expression of the invariant measure is known.

   [Chapter 2, 3 and 5]

9. The global cloud fraction, detected by a spectroradiometer aboard the Terra and Aqua satellites, is approximately 0.67.

10. The year 2020 has shown how challenging the study of the evolution of an event can be when variability and randomness are involved.

11. The word *problem* comes from the ancient Greek *proballein*, which literally means "to throw forward". So originally, a problem did not imply a difficulty, but only the act of bringing forth a situation.