



“V Escuela de Verano en Sistemas Complejos”

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Computing thanks to randomness

Abstract

Randomness is known in various fields as an important source of dynamics. For instance in physics, stars arise from the non-uniformity of the gaze concentration in space; randomness explains as well why some systems tend to converge to stable state. It turns out that randomness is now also known to be an important factor of efficiency in computation. We will see in these three lectures how computer scientists have learnt to use randomness to compute, verify, identify without leaking, obtain consensus, bug correction, save memory... We will see on various examples how randomness may arise easily in real systems and improve their behavior, accuracy and efficiency. To conclude, let's mention that one intriguing question remains unanswered in spite of many efforts: may randomness allow a huge gain in power or only small improvement? that is to say can we solve efficiently with randomness problems that requires exponential time deterministically? (such as exhaustive searches).