

Condensation phenomena in random trees

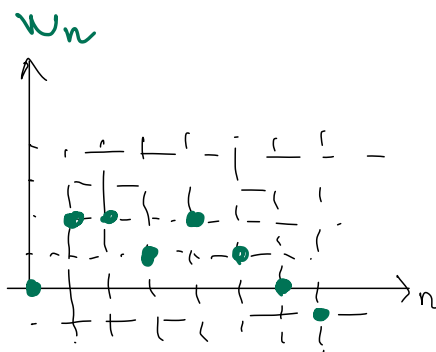
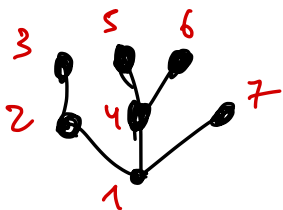
Igor Kortchemski
Condensation phenomena
in random trees
ETH, Spring 2024

Introduction

Goal: study the "geometry" of the genealogical tree of a population which starts from one individual, and where individuals reproduce in an iid fashion, when the size of the population is large (this is the genealogical tree of a Bienaymé-Corton-Nelson process). In particular, we identify a "condensation regime".

To do this, the main ingredient will be limit theorems for random walks. These results are of independent interest, and will actually be the first part of the course.

Connection between (random) plane trees and (random) paths in one picture:



vertices ordered in depth first order

$W_{n+1} - W_n = \# \text{ of children of } n\text{-th vertex} - 1.$

Outline of the course:

Chapter 1: Large deviations in the Gromov regime

Chapter 2: One-big jump phenomenon

Chapter 3: Application to random trees

} random walks

(! no lectures on March 21st nor March 28th)