

Pitman-Yor process

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Pitman-Yor process

Chinese Restaurant process

- approaches zero very fast
- after a while, almost no new items are generated

Pitman-Yor process

- generalization of the Chinese Restaurant process
- the generated distributions has a longer tail
- two hyperparameters: α and d

Chinese restaurant process

- 1 Imagine a restaurant has infinite number of round tables.
- 2 Each table accomodates an infinite number of customers.
- 3 The first customer walks in, sits down at the first table and order a meal from the base probability distribution P_0 .
- 4 Suppose there are H customers already sitting down at various tables and a new customer walks in.
- 5 With probability $\alpha/(\alpha + H)$, he starts a new table and order a meal from the base probability distribution P_0 .
- 6 With probability $H/(\alpha + H)$, he randomly picks already-seated customer and sits down at his table with already ordered meal.

Pitman-Yor process

- 1 Imagine a restaurant has infinite number of round tables.
- 2 Each table accomodates an infinite number of customers.
- 3 The first customer walks in, sits down at the first table and order a meal from the base probability distribution P_0 .
- 4 Suppose there are H customers already sitting down at K different tables and a new customer walks in.
- 5 With probability $(\alpha + dK)/(\alpha + H)$, he starts a new table and order a meal different from others (from P_0).
- 6 With probability $(H - dK)/(\alpha + H)$, he randomly picks already-seated customer and sits down at his table with already ordered meal.

Pitman-Yor process

$$P(w_i) = \frac{\text{count}_{-i}(w_i) - d}{\alpha + i - 1} \text{ if } \text{count}_{-i}(w_i) > 0$$

$$P(w_i) = \frac{\alpha + dK}{\alpha + i - 1} P_0 w_i \text{ if } \text{count}_{-i}(w_i) = 0$$

- $0 \leq d < 1; \alpha > 0$
- $d = 0$... Chinese restaurant process
- Is it exchangeable?
- In literature, the two hyperparameters are often called a and b
($b = \alpha, a = d$)