Cyberfood

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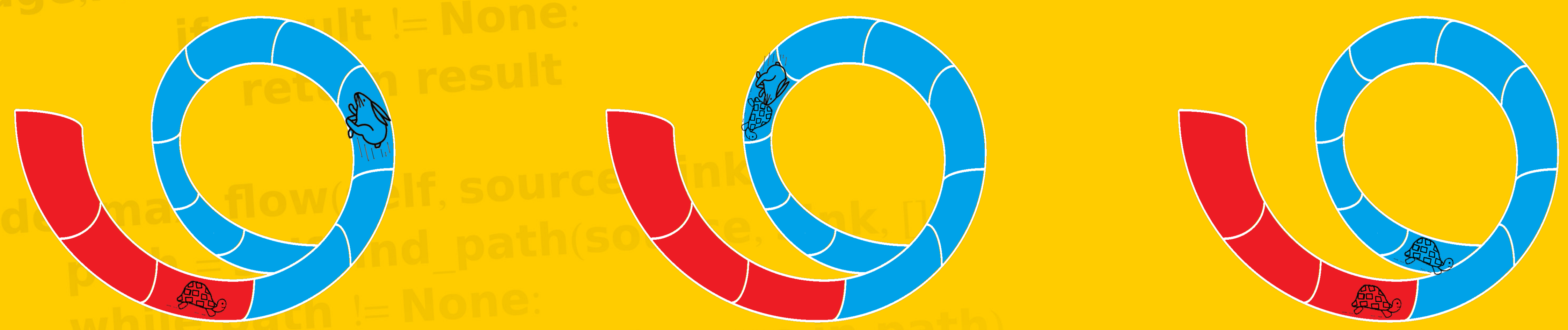
Easy: How many flavors are in the list?

Turtle moves at speed one

Bunny moves at speed two



- Suppose the list is composed of a tail of length T and a cycle of length C
- Turtle and bunny start simultaneously from the beginning of the list at time 0
- They enter the cycle at time T, when the bunny has an advance of T

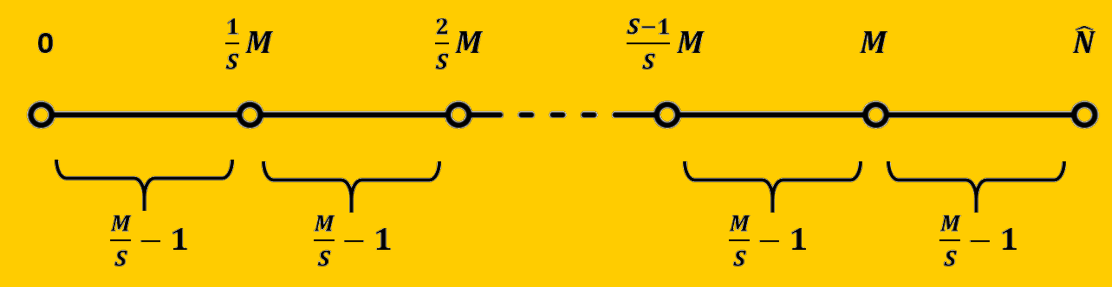
They meet back after some time T+X such that X = T+2X (mod C), i.e. at time C.

- Right now start a second turtle at the beginning of the list.
- As a matter of fact both turtles will meet at time C+T at the cycle's entry !

Medium: How many flavors do exist?

- Flavours are uniformly distributed between 1 and N
- Let M be the maximum of the S samples
- The minimum-variance unbiased estimator of N is $\hat{N} = M + \frac{M-S}{S}$

Imagine your S samples evenly space throughout the range.



The gap between two samples is $\frac{M}{S} - 1$

Hard: Exploration-Exploitation trade-off

- Exploration : Try leaves from different trees to enhance your estimate of their probability to please Heidi.
- Exploitation : Prefer leaves from trees that are most likely to please Heidi
- Trade-off : You need to balance these two components in your decisions

Be creative ;-) and use any reinforcement learning approach (sampling, backtracking, heuristics, ...)

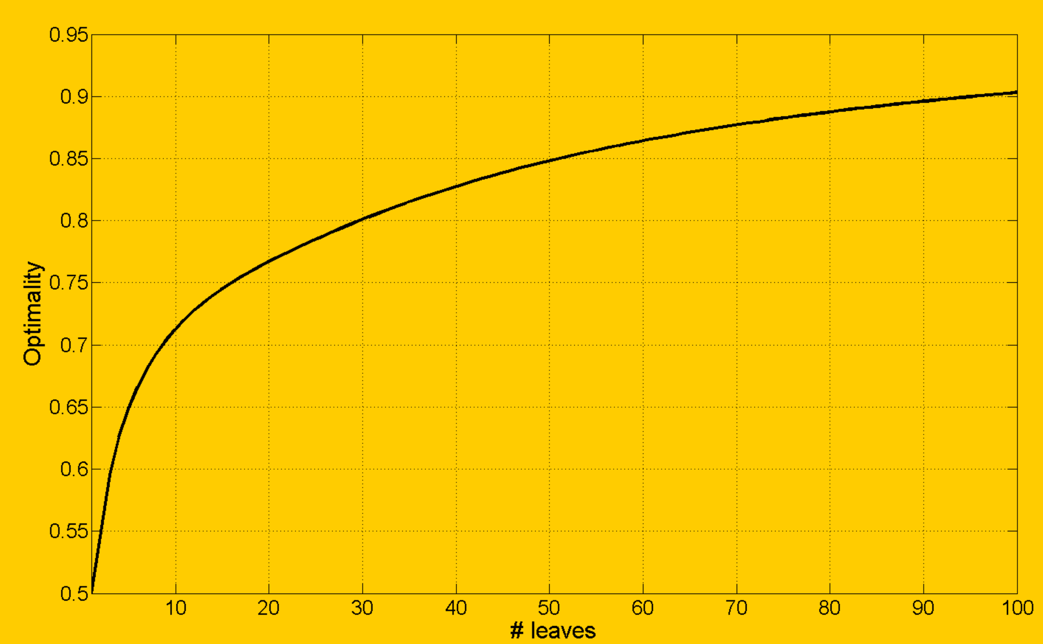
An astonishingly trivial and fast, but efficient solution is:

#tasty leaves total #leaves

Optimistic initialization s[i]=t[i]=1

Act greedily : pick leave from tree with highest probability s[i]/t[i]

Update s[i] according to Heidi's feedback



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