

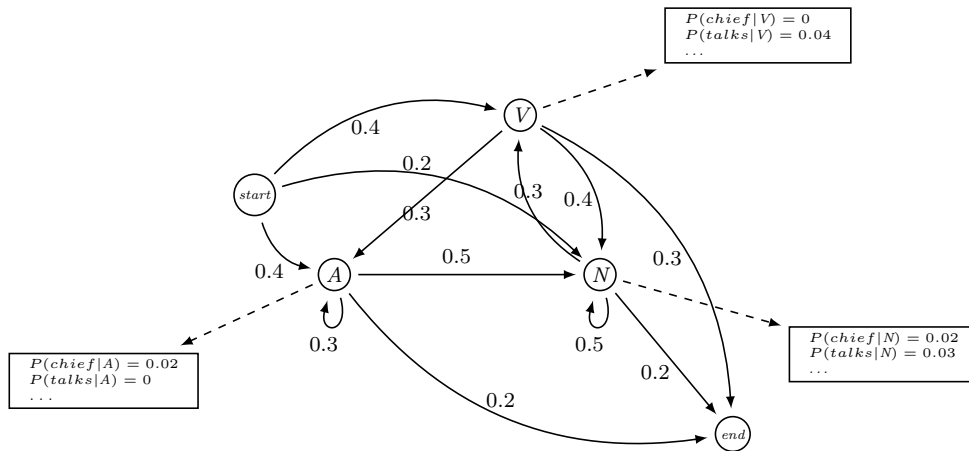
# Machine Learning

## Exercises: HMM

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**Exercise 1** Consider the following HMM for POS tagging:



Given this HMM,

1. calculate the probability  $P(\text{chief talks}, N N)$ .
2. what is the probability of observing the sequence “chief talks” with a POS tag *A* for “chief”?
3. what is the probability of a POS tag sequence *N V*?

Solution:

1.  $P(\text{chief talks}, N N) = 0.2 \cdot 0.02 \cdot 0.5 \cdot 0.03 \cdot 0.2 = 120 \cdot 10^{-7} = 12 \cdot 10^{-6}$
2.  $P(\text{chief talks}, A N) + P(\text{chief talks}, A A) + P(\text{chief talks}, A V) = 0.4 \cdot 0.02 \cdot 0.5 \cdot 0.03 \cdot 0.2 + 0 + 0 = 240 \cdot 10^{-7}$
3.  $P(N V) = 0.2 \cdot 0.3 \cdot 0.3 = 18 \cdot 10^{-3}$