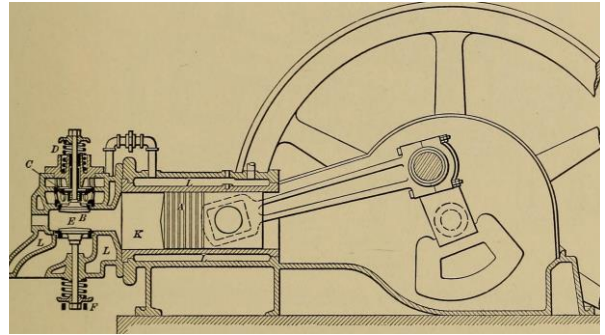


How to Quantitate a Markov Chain?

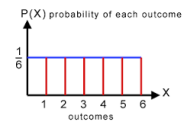
CHIN-NING, CHOU WEI-CHANG, LEE
STOCHASTIC PROCESS PROJECT1



Shannon Entropy

$$H(X) = - \sum_{x \in X} p(x) \log p(x)$$

Maximizer of Shannon Entropy



Kullback-Libler Divergence

$$D(p||q) = - \sum_{x \in X} p(x) \log \frac{p(x)}{q(x)}$$

KL Divergence Will Monotonically Decrease



$$D(p(x_n)||q(x_n)) \geq D(p(x_{n+1})||q(x_{n+1}))$$

Conditional Entropy

$$H(Y|X) = \sum_{x \in X} p(x) H(Y|X=x)$$

Conditional Entropy Monotonically Increase

$$H(X_{n+1}|X_1) \geq H(X_n|X_1) \quad \forall n$$



Data processing inequality

$$I(X_1; X_{n-1}) \geq I(X_1; X_n)$$

Simulation Time!

Conclusion

Two Different Views on Entropy



vs.

