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CSCI 360: Introduction to Artificial Intelligence

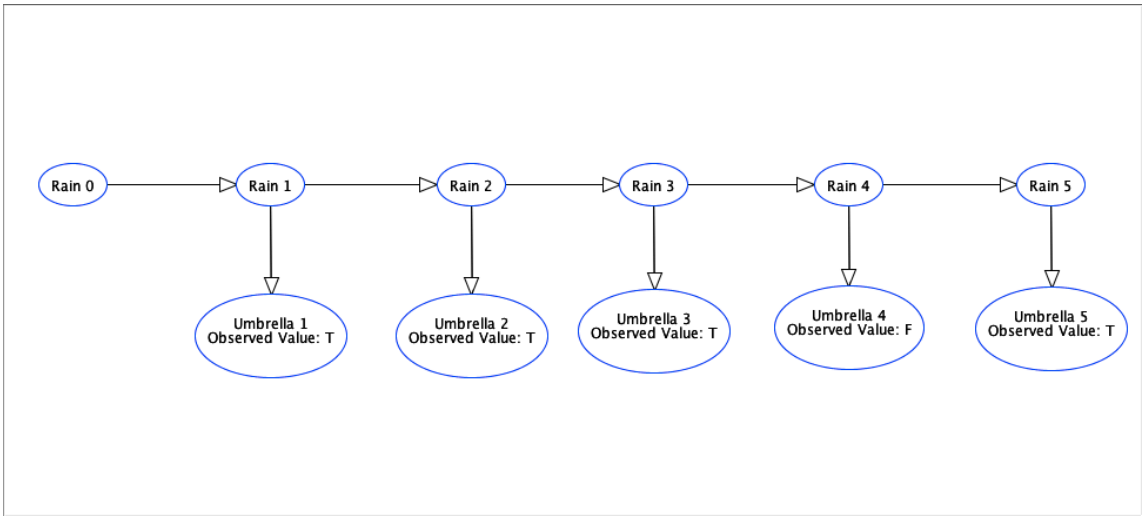
Project #3: Part 1 (Bayesian Networks)

1. $P(Rain_5 = True \mid Umbrella_1 = True, Umbrella_2 = True, Umbrella_3 = True, Umbrella_4 = False, Umbrella_5 = True) = 0.73194$

   $P(Rain_5 = False \mid Umbrella_1 = True, Umbrella_2 = True, Umbrella_3 = True, Umbrella_4 = False, Umbrella_5 = True) = 0.26806$

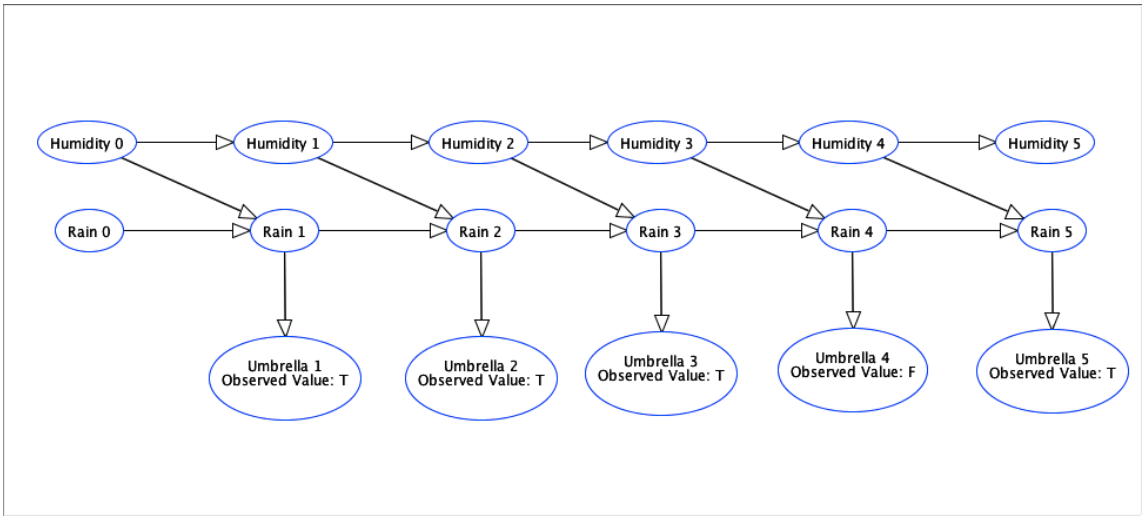
   $P(e \mid Umbrella_1 = True, Umbrella_2 = True, Umbrella_3 = True, Umbrella_4 = False, Umbrella_5 = True) = 0.04099$

   Real-world application: Given a series of economic events, and a sequence of DJIA index, we can predict the probability of whether the DJIA index is going to increase or decrease.

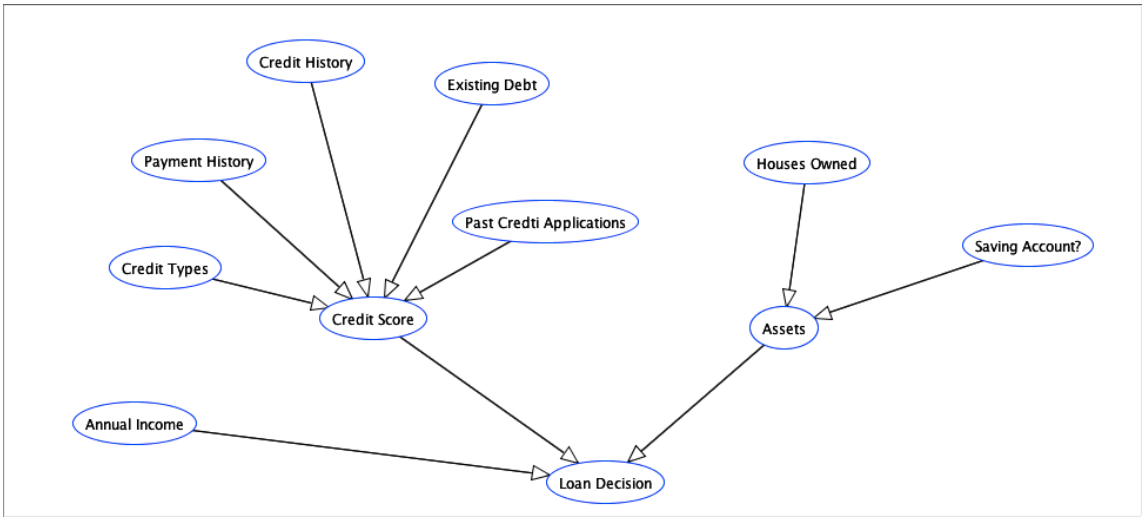



2. Because $Humidity_t$ and $Umbrella_t$ are not directly connected, but rather connected through $Rain_t$, $Humidity_t$ and $Umbrella_t$ are conditionally independent given $Rain_t$. Because $Humidity_t$

and $Rain_t$ are not directly connected, $Humidity_t$ and $Rain_t$ are independent of each other.




3. Chase Bank Loan Decision Bayesian Network




3.1. Scenario 1: high annual income, good credit score, many assets

P (Loan Approved | high annual income, good credit score, many assets) = 0.95

3.2. Scenario 2: low annual income, bad credit score, few assets

P (Loan Approved | low annual income, bad credit score, few assets) = 0.1