- *Hidden Markov models*
    - -> this is in comparison to K means with clustering and centroids
    - -> Markov models deals with probability distributions
        - -> e.g predicting the weather depending on the current weather
        - -> this is based off of a large data set for the weather

    > "The Hidden Markov Model is a finite set of states, each of which is associated with a (generally multidimensional) probability distribution []. Transitions among the states are governed by a set of probabilities called transition probabilities."
    > (http://jedlik.phy.bme.hu/~gerjanos/HMM/node4.html)

    - *-> (above) the definition of a Hidden Markov model*
        - it's like quantum mechanics -> there are a finite set of future states
        - -> there is a probability which each possible future could happen
        - -> each of the possibilities are hidden
        - -> the probability a certain one happens is called a transition probability
        - -> depending on a large dataset of different events, those future probabilities can be predicted
        - -> this is the model (in comparison to K Means for example classifying a set of data)
            - there are multiple different futures which it can predict between (e.g rain / snow / sun), vs just one which which a linear regression model might do
- *Observations and states*
    - -> observations at each state
        - at each of the states, we observe the probability that something happens
        - -> in this example the weather is the different states
    - -> you need constant values for the transition distributions
    - -> you define the number of states and what they are -> they are called hidden because you don't see all of them at the same time
        - -> each of the states has observations associated with it (the probability it will happen for example)
    - -> transitions -> if you are on a hot day then there is a percentage change that the next day is another state - based off of the current state
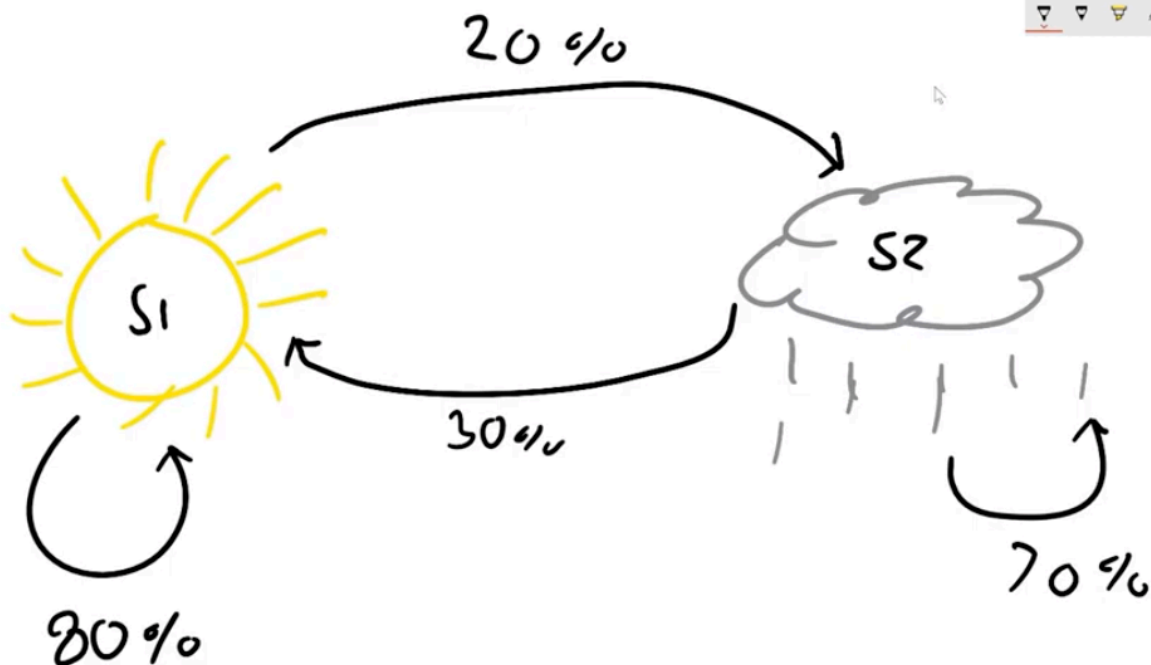
    - -> you have the probability it goes to these different states -> based off of what the current state is
        - -> these are the transition probabilities
        - -> and then you have the observation which is the expectation

- ‣ <u>-> the entire thing fits into a probability distribution about what might and might not happen</u>
- ○ -> each of the states have different parameters associated with them (for example rainfall)
- ○ -> <u>states, transitions, observations, transition and observation probability</u>
- ○ -> predicting future events based off of past events
- ○ -> the difference between Hidden Markov models and linear regression / calculation is that Hidden Markov models uses probability distributions to predict future events or states