**Trading Notes**

States:  Long, zero, short.

Actions:  Buy, Sell, none.

In addition to the position based states, you'll want states based on your technical indicators.You can discretize these states.

You need some indicators in there -- e.g. bollinger, momentum, etc.

rewards are daily return for each day of holding a position

s,a,s',r tuple is:  s (current position), a (possible action) s' (next state) and r (profit from closing position?)

You're going to be iterating over time-series data and making state transitions.  The "states" are based on the technical indicators you choose.

 You should have about 5 components of your state, so it's a 5 dimensional world.

**e instructors' answer,**

*where instructors collectively construct a single answer*

Pick 3 indicators, use 10 discrete values for each = 1000 states.  I'd try bollinger, and two other factors.

Meaning of going from s to s' depends on how you define state.

Suppose a state is a discretized set of indicators.  For simplicity, let's we pick just ONE:  20 day bollinger bands, discretized to be -1 if the stock price exceeds "-2" (rolling\_mean - 2\*rolling\_std), +1 if stock price exceeds "+2", and zero in between.  (Discretized to only 3 factors, speaking R, or states in Q-learning).    
  
I'm following a B-Band strategy as discussed in the lecture, so I buy the stock after it crosses back over from the state s=-1 to the s'=0.  I've performed an ACTION a, but my action has not caused the state to make the transition.  The transition happens all by itself due to the market.  So now let's redefine an action as something that the market does to move my stock indicator.  around between the three BB states defined above.

Then how do I buy, sell and do nothing (within the context of a Q learner) if states and actions are already defined?

 The states can be position,indicators.  So for 3 indicator states (-1,0,1) and 3 types of position (buy,nothing,sell) there are 9 combinations:  (-1,buy),(-1,nothing),(-2,sell),(0,buy),...

The Q table is then a 9x9 matrix, with the market moving between some states, and a buy,sell moving between others.

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You should have as factors things like: Holding, not holding, cumulative return since holding.