3. Tossing 10 coins

1. Assumed prior distribution

**Program Flow**

1. define variables

* e.g. coin toss outcome = [1,1,0,0,0,0,0,0,0,0,0,0] where 1=head, 0=tail
* assume distribution of prior is [1/11, 1/11, 1/11, 1/11, 1/11, 1/11, 1/11, 1/11, 1/11, 1/11]

1. calculate likelihood according to coin toss outcome
2. calculate marginal probability p(x) according to prior and likelihood
3. calculate posterior by using Bayes Theorem
4. Estimate p using mle & map
5. repeat from (1) but assume distribution of prior is [0.01, 0.01, 0.05, 0.08, 0.15, 0.4, 0.15, 0.08, 0.05, 0.01, 0.01]

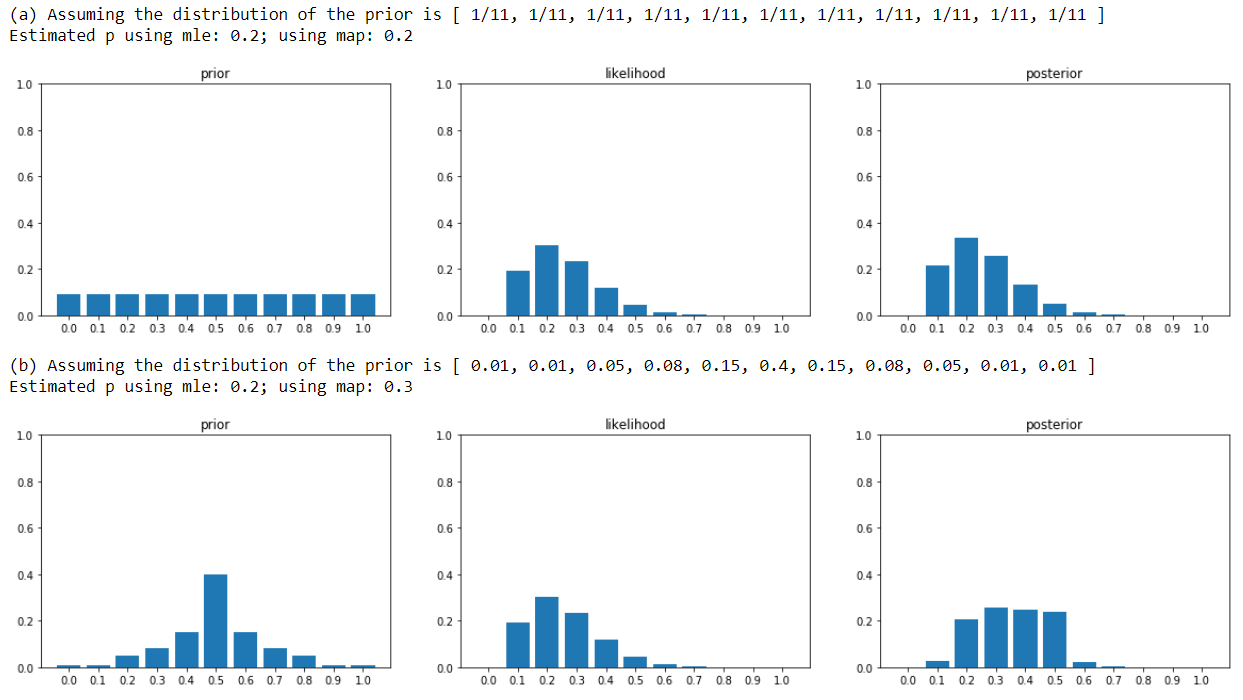
**Theory**

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**Maximum Likelihood Estimation:** p with the highest likelihood

**Maximum a Posteriori Estimation:** p with the highest posterior

**Outcome**



1. Toss 10 coins 50 times

**Program Flow**

1. define variables

* assume distribution of prior is [1/11, 1/11, 1/11, 1/11, 1/11, 1/11, 1/11, 1/11, 1/11, 1/11]

1. toss 10 coins using coin\_sim()
2. pick p (assume distribution of p is equally 1/11, not affected by prior)
3. toss coins using p as probability of tossing a head
4. calculate posterior using Bayes Theorem as mentioned above
5. draw graph if iteration is 10 times

* graph is saved to local in png format

1. repeat from (2) using current posterior as new prior for 50 times

**Theory**

Observation

Likelihood

Prior

Posterior

For every iteration (coin toss), the posterior will become the prior for the next iteration.

**Outcome**

