#HM3

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#Answer #1.a & 1.b & 1.c & 1.d

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var model = function() {

var A = 20;

var B = 20;

var obA = 7;

var obB = 12;

var rateA = uniform(0,1);

var rateB = uniform(0,1);

var snA = binomial({n:A,p:rateA});

var snB = binomial({n:B,p:rateB});

var rateDiff = rateB - rateA;

var diffPos = rateB > rateA;

// var rateDiff = rateA - rateB;

// var diffPos = rateA > rateB;

// the upper codes for rateDiff & Diffpos can be changed and the difference can be observed

condition(snA == obA && snB == obB)

return {"rateA":rateA,"rateB":rateB,"rateDiff":rateDiff,"diffPos":diffPos};

}

var d = Infer({method:"MCMC",samples:10000}, model);

var exp\_map = function(d,arr) {

display("expectation:");

display(map(function(a) { [a,expectation(marginalize(d, a))] }, arr));

display("MAP:");

display(map(function(a) { [a,MAP(marginalize(d, a))] }, arr));

}

exp\_map(d,["rateA","rateB","rateDiff","diffPos"]);

~~~~

#Answer #1.e:

B should be the seleceted one.

Since:

rateDiff,0.22339691024799496 (when the code is var rateDiff = rateB - rateA;

var diffPos = rateB > rateA; ) whereas rateDiff,-0.21885408499288184 (when the code is var rateDiff = rateA - rateB;

var diffPos = rateA > rateB; )

#Answer #2:

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var model = function() {

var measurements = [-26.5, 3.2, 7.9, 9.9, 9.6, 10.0, 10.1]; //mean:3.46

var skill = mem(function(p) {

return gaussian(3.46,p)

});

var performance = mem(function(p) {

return gaussian(skill(p), p);

});

return {

performance1:performance(1),

performance2:performance(2),

performance3:performance(3),

performance4:performance(4),

performance5:performance(5),

performance6:performance(6),

performance7:performance(7),

skill1:skill(1),

skill2:skill(2),

skill3:skill(3),

skill4:skill(4),

skill5:skill(5),

skill6:skill(6),

skill7:skill(7)

};

}

var d = Infer(model);

var exp\_map = function(d,arr) {

display("Marginals:");

map(function(a) {display(a);display(marginalize(d, a)) }, arr);

display("expectation:");

display(map(function(a) { [a,expectation(marginalize(d, a))] }, arr));

display("MAP:");

display(map(function(a) { [a,MAP(marginalize(d, a))] }, arr));

}

exp\_map(d,["performance1","performance2","performance3","performance4","performance5","performance6","performance7",

"skill1","skill2","skill3","skill4","skill5","skill6","skill7"]);

~~~~

ranking:

performance3,3.636389053052605,

performance6,3.5225582787267773,

performance1,3.4554236881294074,

performance2,3.411902578996152,

performance7,3.33513243720899,

performance5,3.2809154796810223,

performance4,3.2562608434037275,

skill3,3.5940594783078583,

skill6,3.4380524198930833,

skill1,3.434208300367762,

skill7,3.4031863314594823,

skill2,3.3732054434696286,

skill4,3.3094981056159316,

skill5,3.278417684801425,

#Answer #3:

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var model = function() {

var data = [13, 24, 8, 24, 7, 35, 14, 11, 15, 11, 22, 22, 11, 57, 11, 19, 29, 6, 19, 12, 22, 12, 18, 72, 32, 9, 7, 13, 19, 23, 27, 20, 6, 17, 13, 10, 14, 6, 16, 15, 7, 2, 15, 15, 19, 70, 49, 7, 53, 22, 21, 31, 19, 11, 18, 20, 12, 35, 17, 23, 17, 4, 2, 31, 30, 13, 27, 0, 39, 37, 5, 14, 13, 22];

var len = data.length;

var alpha = 1/listMean(data); // 1/mean(data)

var lambda\_1 = exponential(alpha);

var lambda\_2 = exponential(alpha);

var x= randomInteger(len);

var t = function(i) {

if (x > i) {

return Poisson({mu:lambda\_1});

} else {

return Poisson({mu:lambda\_2});

}

}

mapIndexed(function(i,value) {

observe(t(i),value)

}, data);

return {

x:x,

lambda\_1:lambda\_1,

lambda\_2:lambda\_2

}

}

var d = Infer({method:"MCMC",kernel:"MH",samples:1000,verbose:true},model);

var exp\_map = function(d,arr) {

display("Marginals:");

map(function(a) {display(a);display(marginalize(d, a)) }, arr);

display("expectation:");

display(map(function(a) { [a,expectation(marginalize(d, a))] }, arr));

display("MAP:");

display(map(function(a) { [a,MAP(marginalize(d, a))] }, arr));

}

exp\_map(d,["x","lambda\_1","lambda\_2"]); //exp.x is the day before the habit changes

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