

## **CSC 535: Assignment #6**

Due on Wednesday, October 31, 2018

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## Question 1

### Probability table

(a) Produce the  $9 \times 9$  table  $p(\text{measured\_angle} \mid \text{angle})$

Table 1:  $p(\text{measured\_angle} \mid \text{angle})$

	Measured Angle								
	1	2	3	4	5	6	7	8	9
1	0.7	0.2	0.1	0	0	0	0	0	0
2	0.3	0.4	0.2	0.1	0	0	0	0	0
3	0.1	0.2	0.4	0.2	0.1	0	0	0	0
4	0	0.1	0.2	0.4	0.2	0.1	0	0	0
5	0	0	0.1	0.2	0.4	0.2	0.1	0	0
6	0	0	0	0.1	0.2	0.4	0.2	0.1	0
7	0	0	0	0	0.1	0.2	0.4	0.2	0.1
8	0	0	0	0	0	0.1	0.2	0.4	0.3
9	0	0	0	0	0	0	0.1	0.2	0.7

(b) Variance of the measurements

## Question 2

### Graphical Model

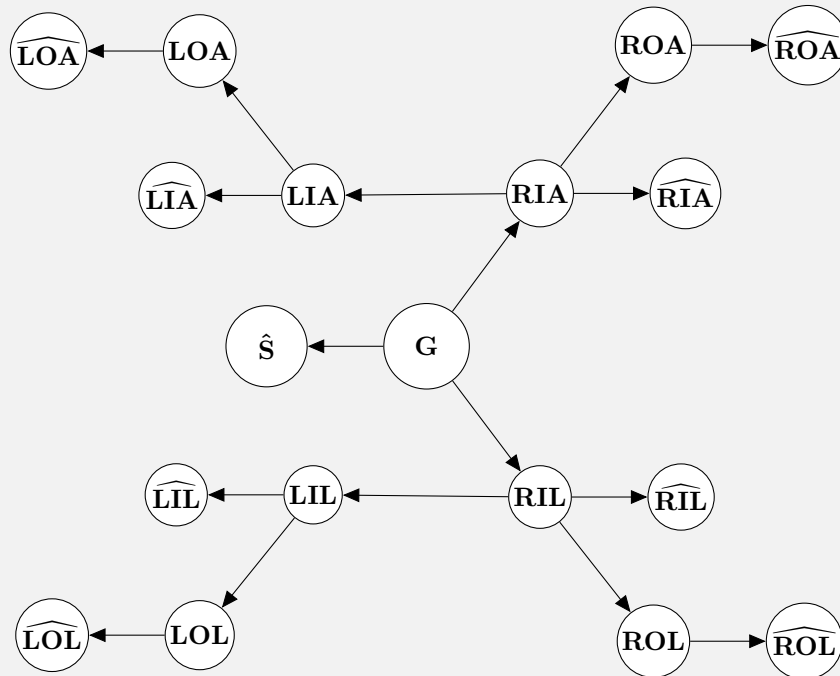


Figure 1: Bayes net for the gender and limb angles of MQLs

#### Legend:

$G$  = Gender  
 $\hat{S}$  = Observed shape  
 $RIA$  = Right inner arm angle  
 $RIL$  = Right inner leg angle  
 $ROA$  = Right outer arm angle  
 $ROL$  = Right outer leg angle  
 $LIA$  = Left inner arm angle  
 $LIL$  = Left inner leg angle  
 $LOA$  = Left outer arm angle  
 $LOL$  = Left outer leg angle  
 $\widehat{XYZ}$  = Observed  $XYZ$

## Question 3

### Formula for the joint distribution

$$\begin{aligned}
& p(G, \hat{S}, RIA, RIL, ROA, ROL, \\
& \quad LIA, LIL, LOA, LOL, \\
& \quad \widehat{RIA}, \widehat{RIL}, \widehat{ROA}, \widehat{ROL}, \\
& \quad \widehat{LIA}, \widehat{LIL}, \widehat{LOA}, \widehat{LOL}) = p(G)p(\hat{S} | G)p(RIA | G)p(RIL | G) \\
& \quad p(LIA | RIA)p(ROA | RIA)p(LOA | LIA) \\
& \quad p(LIL | RIL)p(ROL | RIL)p(LOL | LIL) \\
& \quad p(\widehat{RIA} | RIA)p(\widehat{ROA} | ROA)p(\widehat{RIL} | RIL)p(\widehat{ROL} | ROL) \\
& \quad p(\widehat{LIA} | LIA)p(\widehat{LOA} | LOA)p(\widehat{LIL} | LIL)p(\widehat{LOL} | LOL)
\end{aligned}$$

## Question 4

### Generated samples

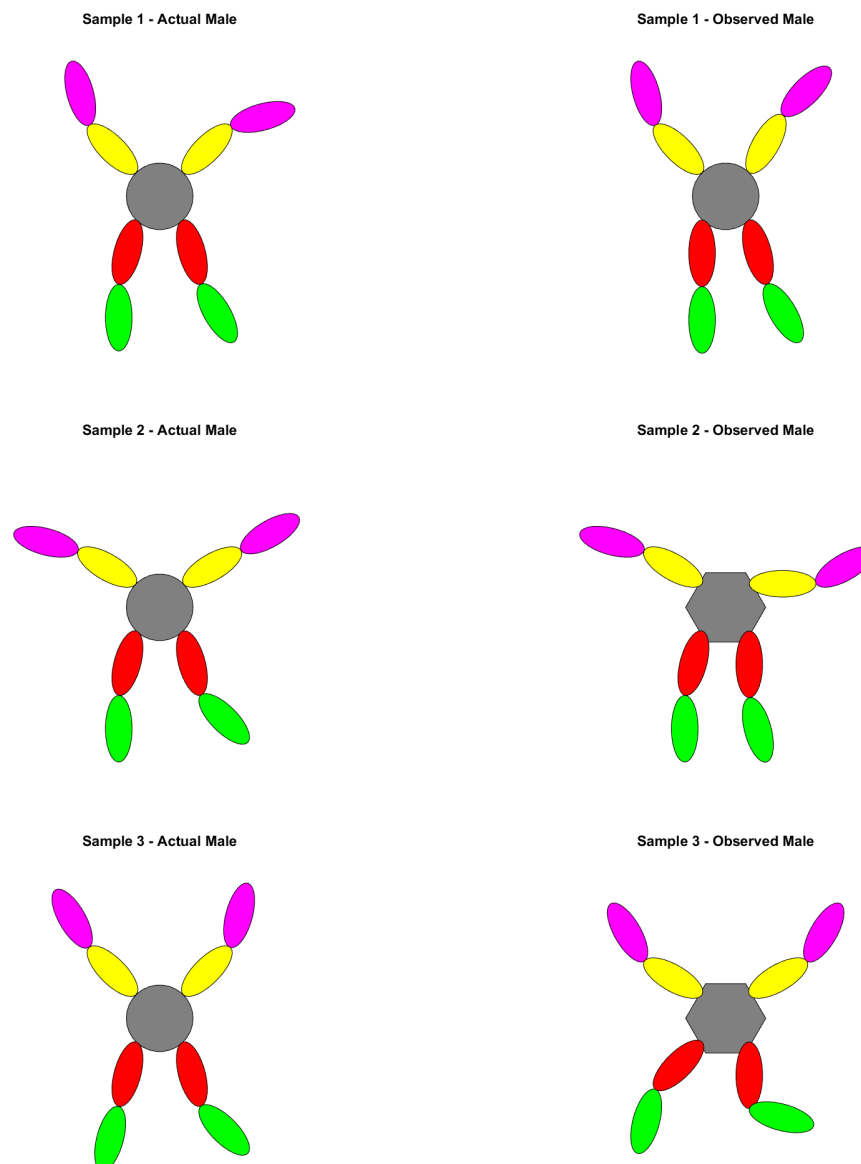


Figure 2: Generated samples 1 - 3 for idealized individuals and observed appearance.

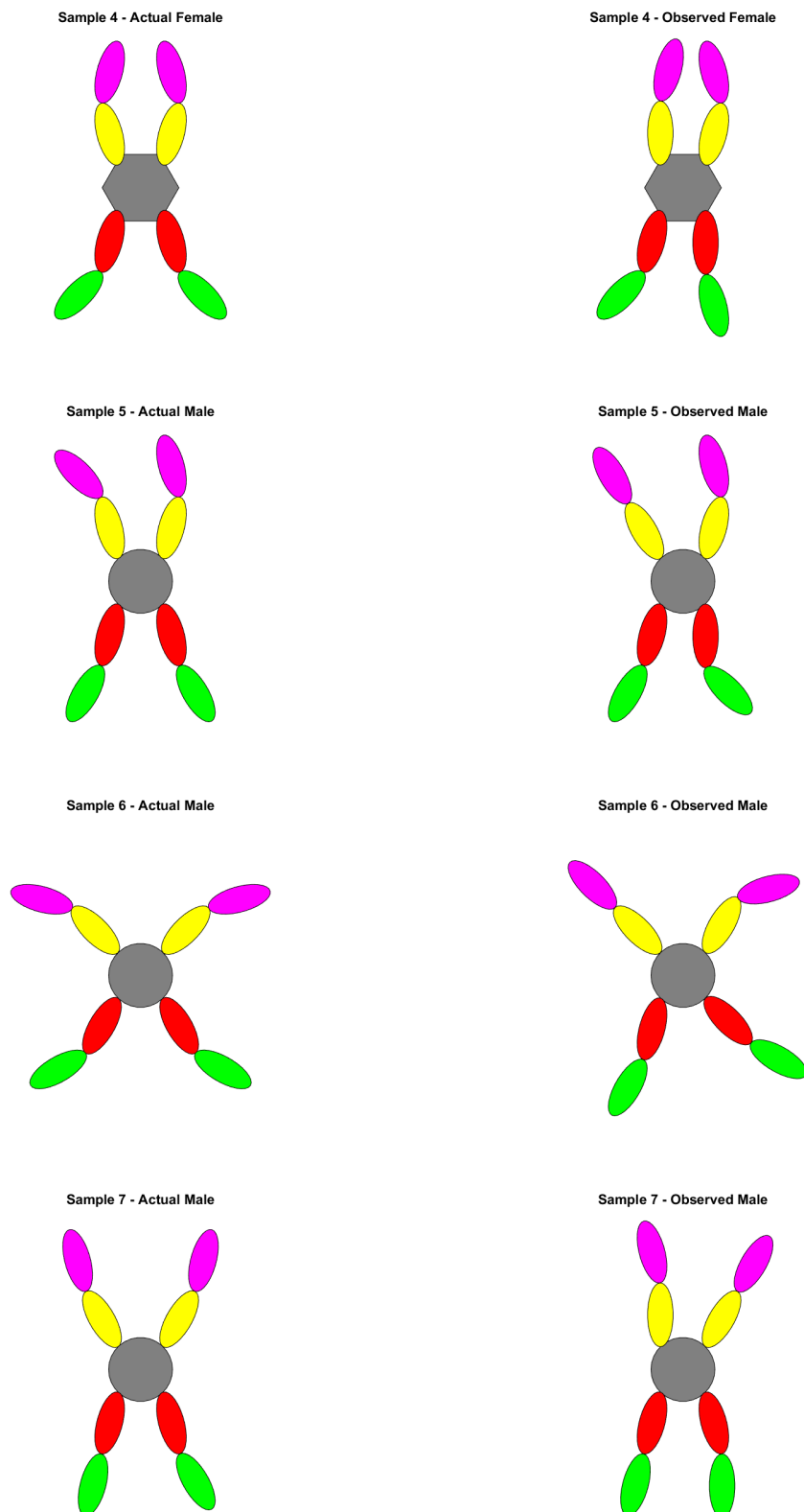


Figure 3: Generated samples 4 - 7 for idealized individuals and observed appearance.

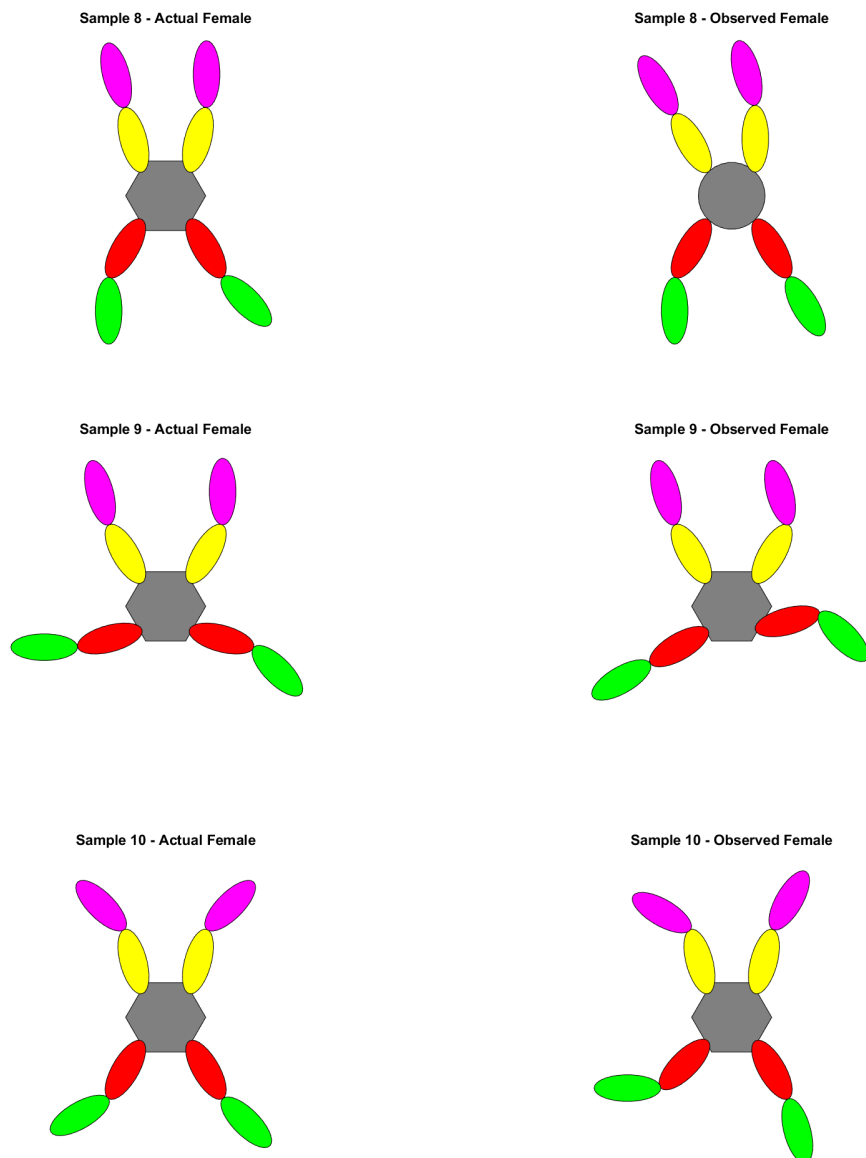


Figure 4: Generated samples 8 - 10 for idealized individuals and observed appearance.

## Question 5

### Deciding gender of MQLs from images

(a) From image of idealized individuals

(b) From image of observed appearance

## Question 6

### Generating synthetic data to experiment with inference

(a) xxx