CSC 535: Assignment #6

Due on Wednesday, October 31, 2018

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Question 1

Probability table

(a) Produce the 9×9 *table* $p(measured\_angle \mid angle)$

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

		Measured Angle								
		1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
Model (True) angle	**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

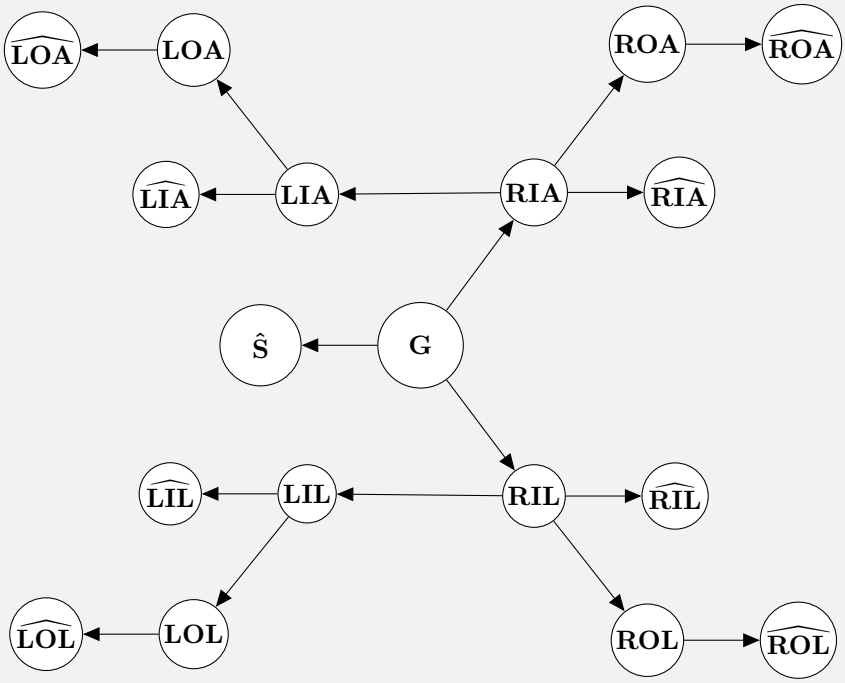

Figure 1: Bayes net for the gender and limb angles of MQLs

Legend:

$$
\begin{aligned}
G &= \text{Gender} \\
\hat{S} &= \text{Observed shape} \\
X &\in \{\text{Right, Left}\} \\
Y &\in \{\text{inner, outer}\} \\
Z &\in \{\text{arm, leg}\} \\
XYZ &= X \quad Y \quad Z \quad \text{angle} \\
\widehat{XYZ} &= \text{Observed} \quad X \quad Y \quad Z \quad \text{angle}
\end{aligned}
$$

Question 3

Formula for the joint distribution

Question 3 continued on next page...

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

Question 4

Generated samples

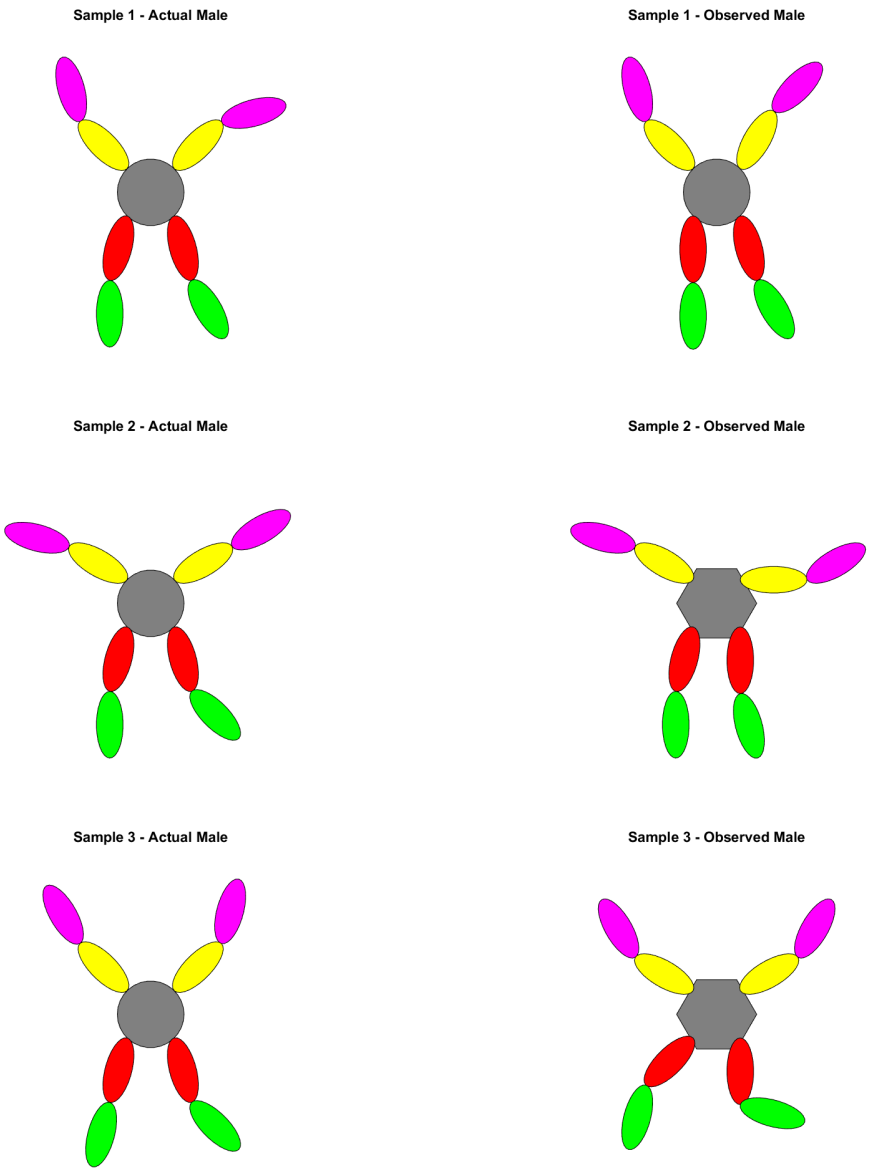

Figure 2: Generated samples 1 - 3 for idealized individuals and observed appearance.

Question 4 continued on next page...

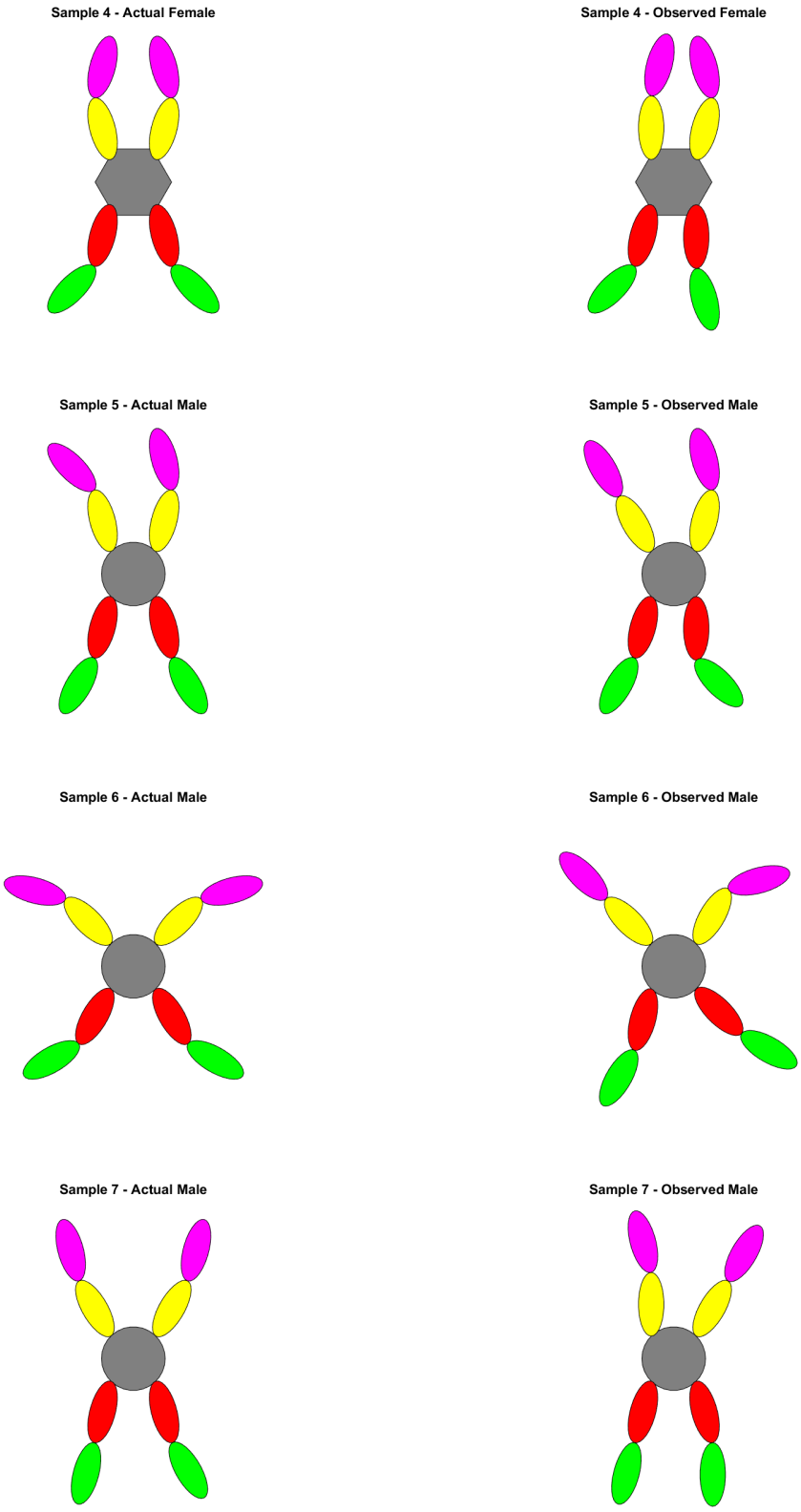

Figure 3: Generated samples 4 - 7 for idealized individuals and observed appearance.

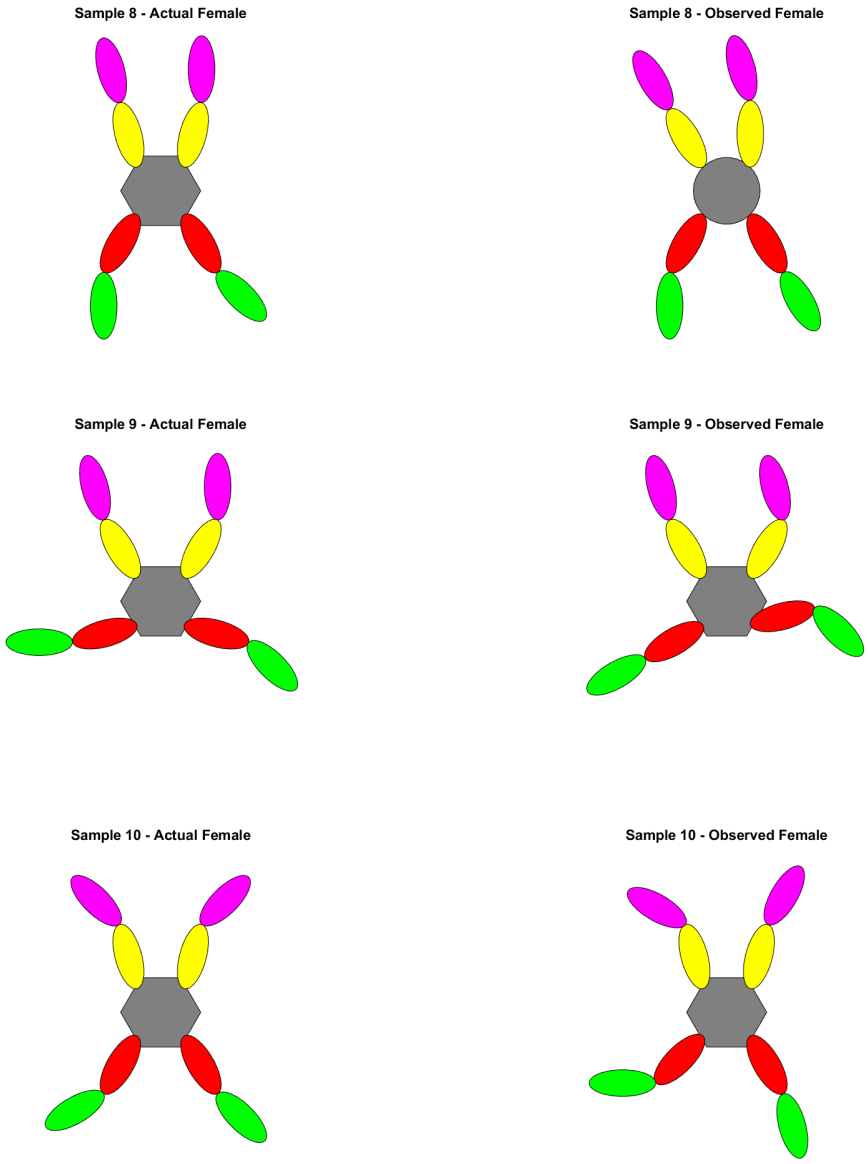

Figure 4: Generated samples 8 - 10 for idealized individuals and observed appearance.

Question 5

Deciding gender of MQLs from images

(a) From image of idealized individuals

(b) From image of observed appearance

Question 6 continued on next page...

Question 6

Generating synthetic data to experiment with inference

(a) xxx