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**
	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
Model (True) angle	**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
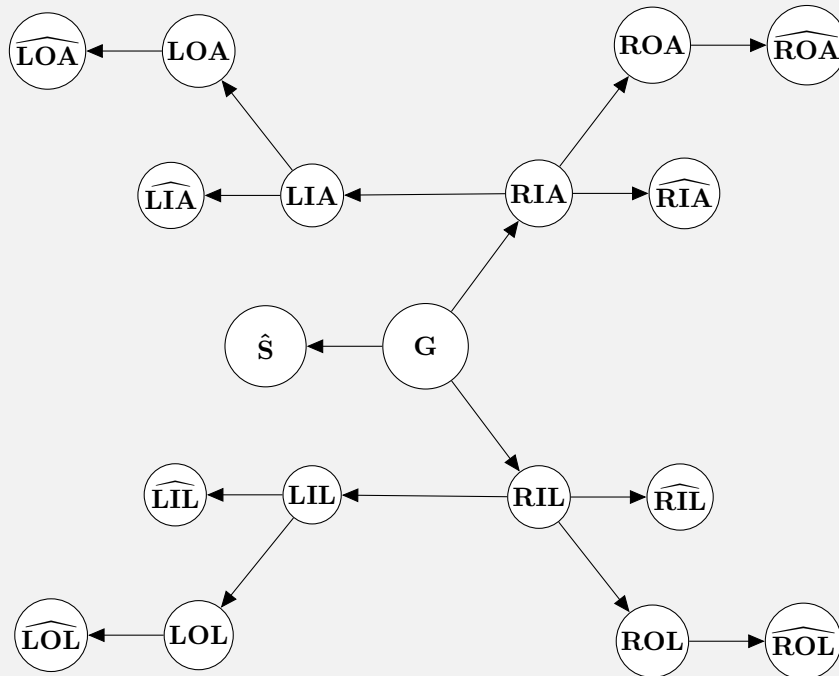
Figure 1: Bayes net for the gender and limb angles of MQLs

Legend:

$$G = \text{Gender}$$
$$\hat{S} = \text{Observed shape}$$
$$RIA = \text{Right inner arm angle}$$
$$RIL = \text{Right inner leg angle}$$
$$ROA = \text{Right outer arm angle}$$
$$ROL = \text{Right outer leg angle}$$
$$LIA = \text{Left inner arm angle}$$
$$LIL = \text{Left inner leg angle}$$
$$LOA = \text{Left outer arm angle}$$
$$LOL = \text{Left outer leg angle}$$
$$\widehat{XYZ} = \text{Observed } XYZ \quad X \in \{R, L\}, Y \in \{I, O\}, Z \in \{A, L\}$$

Question 3

Formula for the joint distribution

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

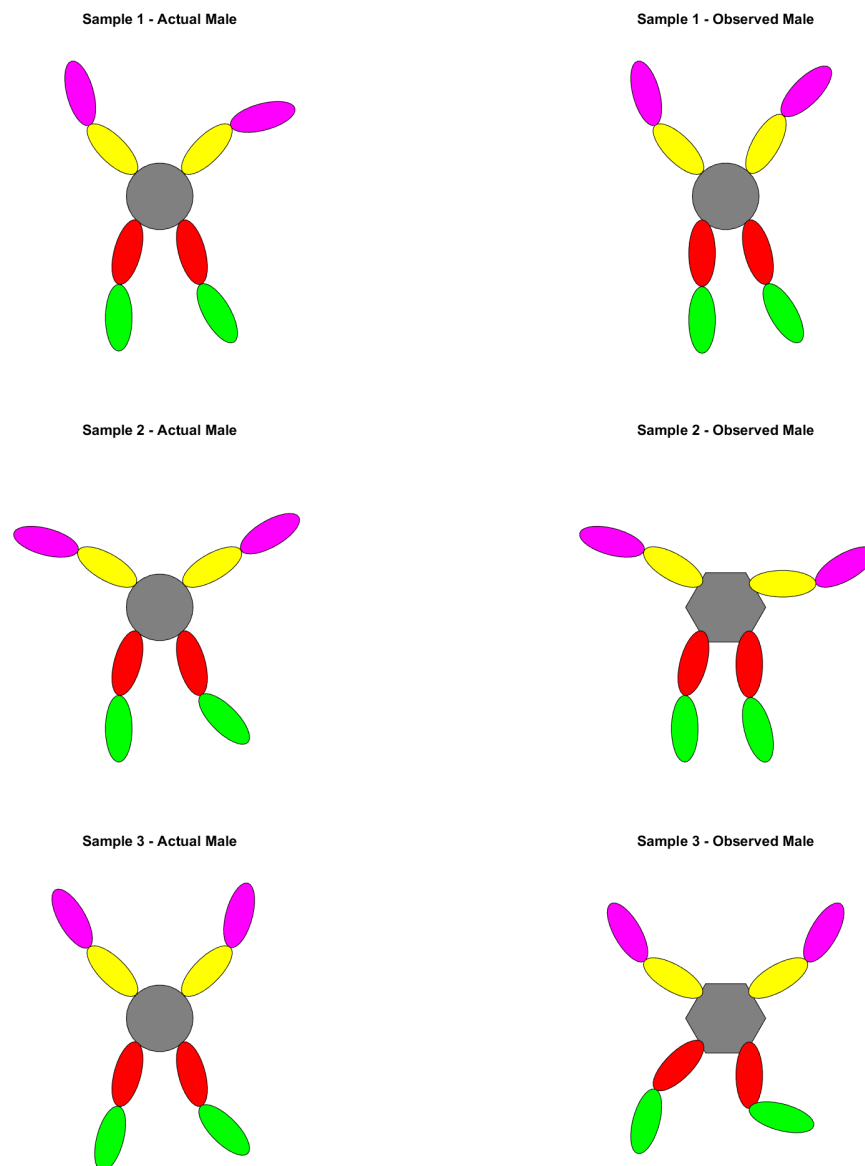# Question 4

Generated samples

Figure 2: Generated samples 1 - 3 for idealized individuals and observed appearance.
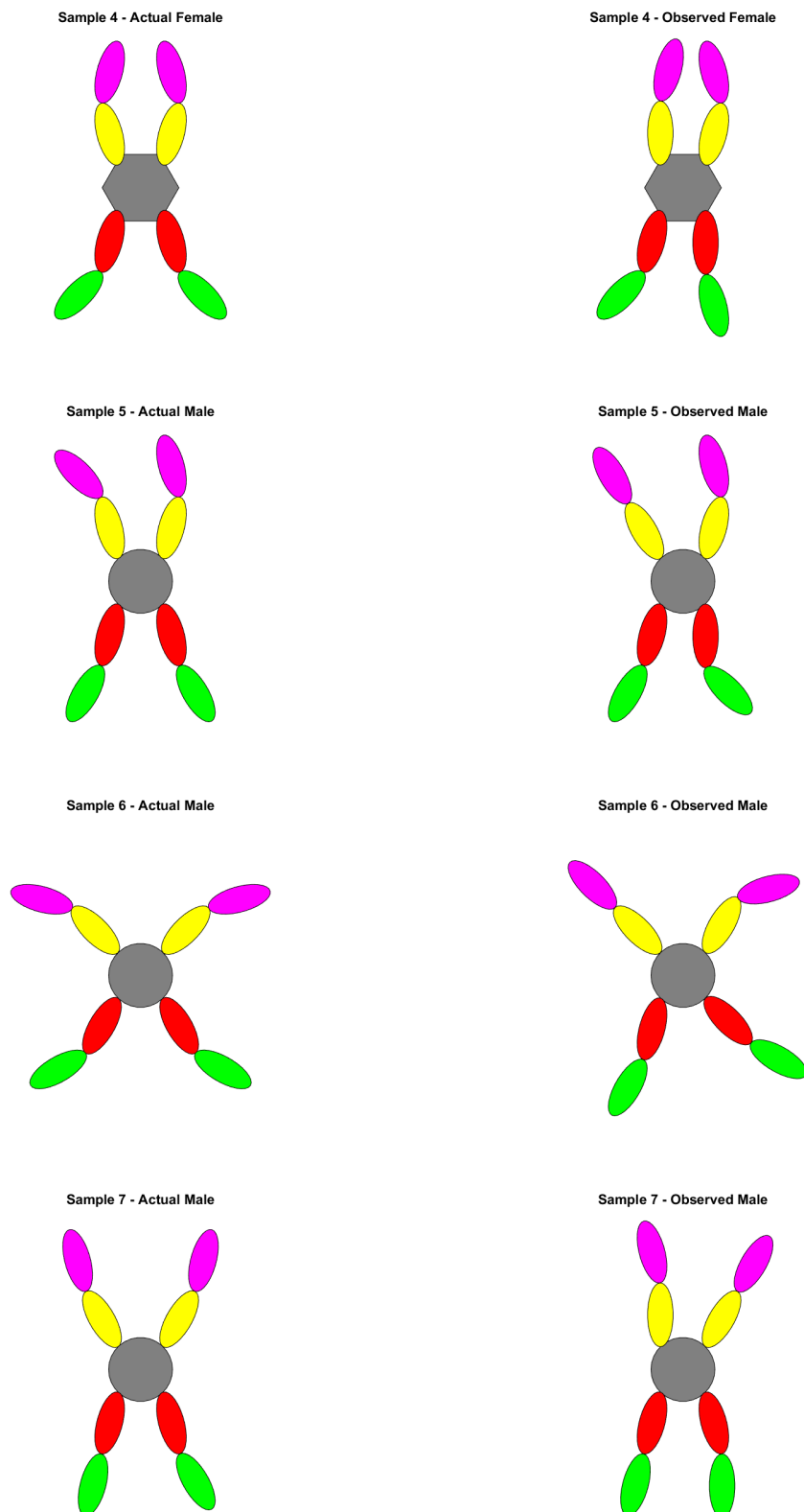
Figure 3: Generated samples 4 - 7 for idealized individuals and observed appearance.
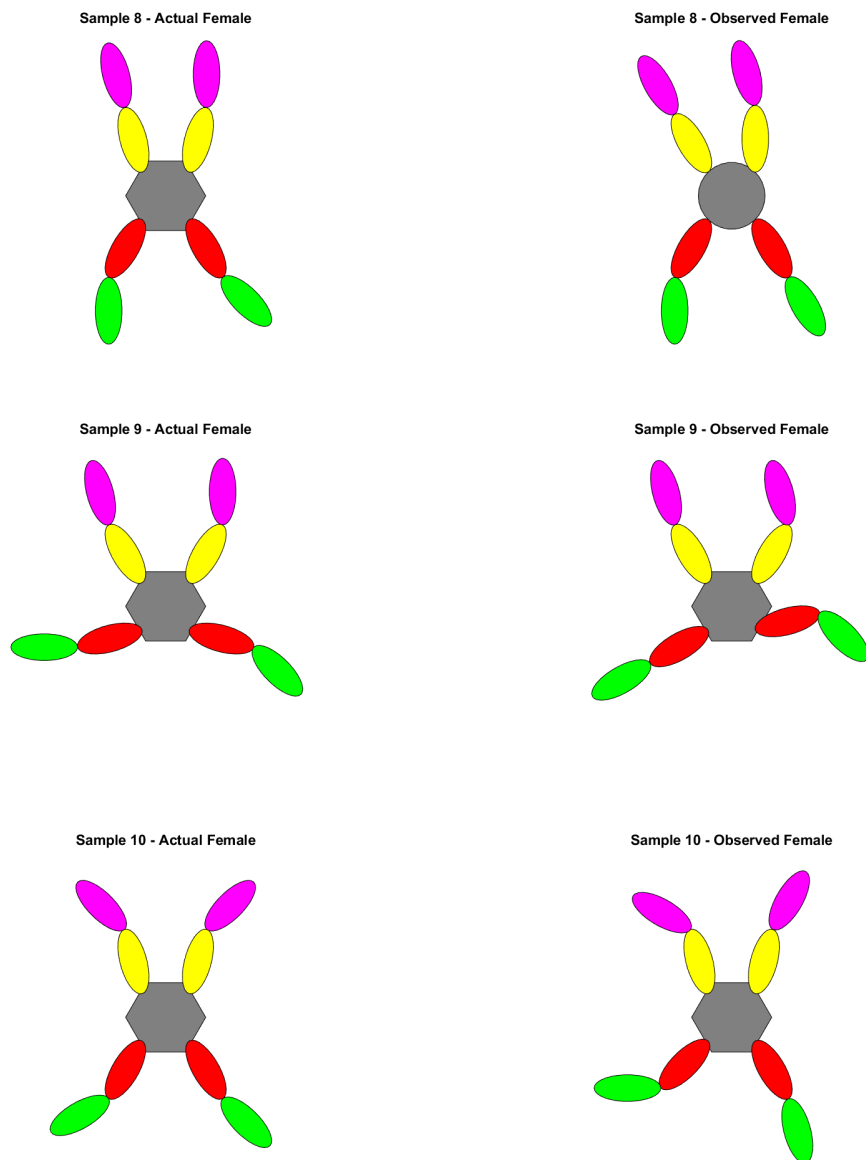
Figure 4: Generated samples 8 - 10 for idealized individuals and observed appearance.

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