EXERCISE 3

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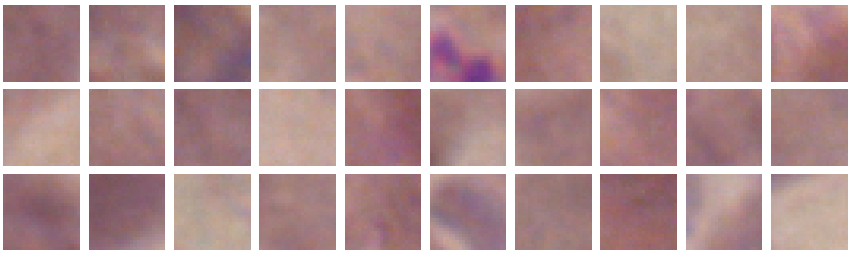
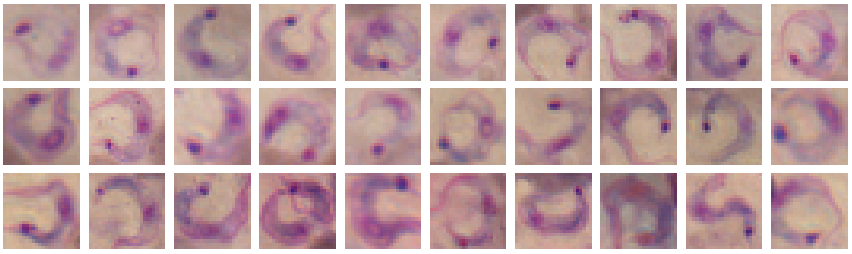
1. Gaussian Discriminant Analysis

(1) Implement the Gaussian Discriminant Analysis model to create a binary classifier for Chagas parasites. There are 60 training examples available, 30 negatives (negatives.zip) and 30 positives (positives.zip). Choose at least 5 features that you consider useful.

Negative examples



Positive examples



(2) Prepare a report containing your final model (including parameters) and the description of the features you used, plots, your analysis and conclusions.

2. Exercise Submission

- Deadline May 18th, 2020.

3. Steps to follow

(1) For each one of the 60 images obtain a feature vector. Example (R_min, G_min, B_min, R_avg, G_avg, B_avg). Now each image will be represented by its corresponding feature vector, for example:

 $\longrightarrow$ $(50, 65, 89, 124, 174, 164)$ *(Note: these numbers were invented)*

(2) Estimate the parameters of your Gaussian discriminat classifier (page 28 of slides): $\phi, \mu_0, \mu_1, \Sigma$.
(3) Apply the Bayes rule to check how many of the 60 images are correctly classified (Pages 14 and 21 of slides).

4. Hints

Some useful matlab/octave commands for this exercise:

- To load an image `n01.png` into variable `i`
  `i = imread("n01.png")`
- To convert a matrix `i` of data type `unit8` to data type `double`
  `x = double(i)`
- To display an image previously loaded into variable `i`
  `imshow(i)`
- To compute the mean of the red-green-blue components of an image saved as a matrix of doubles `x` and size is `24 x 24 x 3`
  `m = mean(x,3)`

5. Visualizing an image as a surface