AutoGuide

- **Motivation**

  Who is this guy ? Do you know ‘cause I really don’t ?
  simply that what the app dose , tells you about pharaonic characters or objects , not just his/her/its name but a brief description in both languages arabic and english.

- **Introduction**

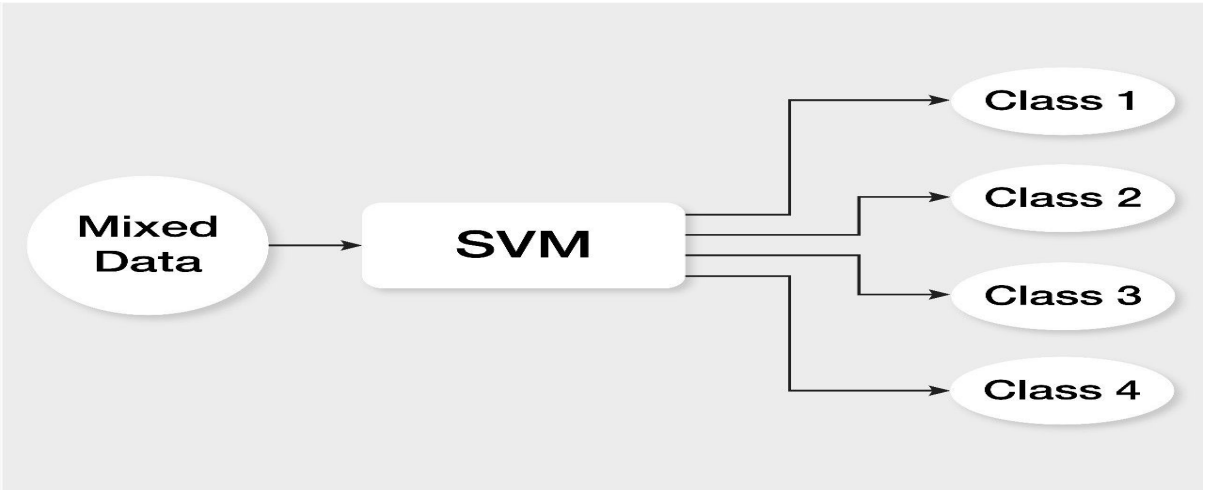
  Thousands of years ago ,We Created the first civilization the world has ever known ,so it’s the time for even machines to recognize our great civilization.

How we made it possible

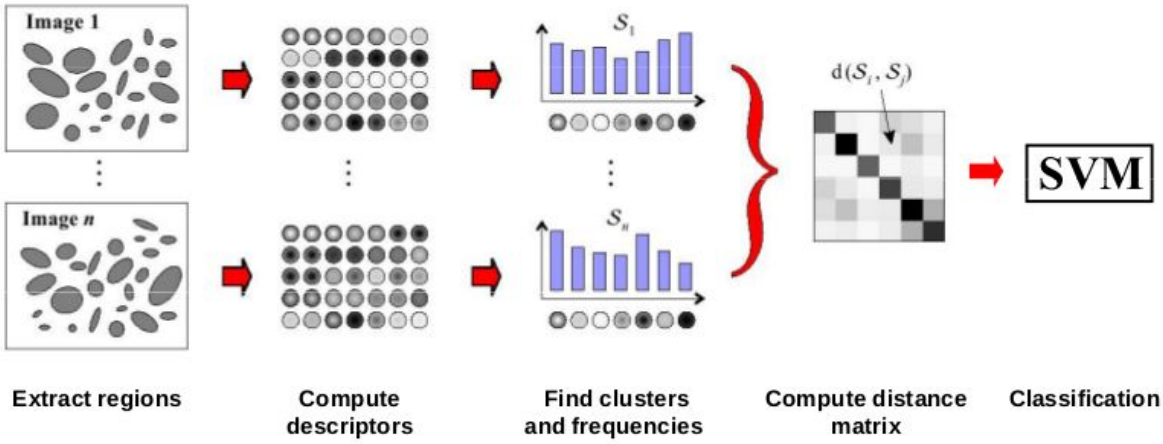
- **Our Application is Divided into two section .**
- **The Model Section :**
  - **We used the concept of ’ VBOF’ Visual Bag Of Features for category classification**

  The model use one of the supervised learning techniques “Support Vector Machine” And MultiLayer Perceptron to classify the input data to multiple classes, every class represent a specific character or object.
  We designed the App in a way that let us choose whether to use SVM or MLP Classifiers, because we figured out that training with MLP is better that SVM.

  SVM is a linear model for classification and regression problems. It can solve linear and non-linear problems and work well for many practical problems. The idea of SVM is the algorithm creates a line or a hyperplane which separates the data into classes.



But as we know life is not easy like that, there are some more work before use SVM model
Actually we need to perform some operations on the images first here is a figure shows what we talking about .



Let's take a look for each phase of them .

- Extract regions & compute description or (feature extraction)
  Considering each pixel can have an 8 bit value, say the image is a 512*512 image will have 512*512x8 bits of information, it's too much info , so in feature extraction we figure out what parts of an image are distinctive , like lines, corners, special patches that can uniquely describe the image. We use "SIFT" algorithm to do that .

- Find clusters and frequencies (Clustering)
  Clustering is the process of organizing objects into groups whose members are similar in some way , in our case is to cluster each image's

features and get the centers of each cluster and building a histogram in order to feed to the classifier.

- Here’s a List of the characters and Objects the model can recognize :
    - Akhenaten_statue

    - Amenhotep_son_of_hapu_statue

    - Apis_statue

    - Hatshepsut_statue

    - Khufu_statue

- Nefrtiti_statue

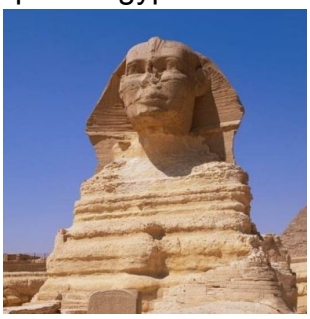
- Rahotep_and_nofret_statue

- Sesostris_ i_statue

- Sesostris_iii_statue

- Sheik_el_balad_statue

- sphinx egypt



- The dagger_of_tutankhamoun

- The_bed_of_tutankhamoun

- The_chair_of_tutankhamoun

- The_dwarf_seneb_and_his_family_statue

- The_seated_scribe_statue

- Thutmose_III_statue

- Tutankhamoun_statue

And to get some familiarity about the implementation :

“AutoGuide_version_2.py”
file it contain the main class “BOV” it train the model ,
and then test the trained model on a new images used in that

“Helpers.py”
it contain some helper classes like
“ImageHelpers” to get the image’s features using “SIFT”,
“BOVHelpers” for clustering the features using “K-means”
Normalizing the data , train the model using “sklearn.svm.SVC” or MLP classifier,
“getFiles” class it helps to read the characters images from multiple files .

- **The mobile App and Server Section:**
    - **We have developed the mobile application using react native ,so that our app can run on either android or IOS platforms**
    - **The user is able to either use the camera to capture an image of a statue or pick an already existing image**
    - **The image will be uploaded to a python flask server which is hosted on DigitalOcean**
    - **Once the image is uploaded to the server will invoke the pretrained Model and feed the image to the model in order to predict the category which this image belongs to**
    - **The model will return the name of the character or the object in the photos as a string**
    - **Once we got the name of the character or object ,it will look up the local database for that name and get all information about it ,in order to view these information to the user**