

## The Scenario



ARCHEOLOGISTS AND TOURISTS COME TO EXPERIENCE THE ANCIENT EGYPTIAN CIVILIZATION AND LEARN MORE ABOUT THE EGYPTIAN CULTURE AND WAY OF LIFE.

## The Problem



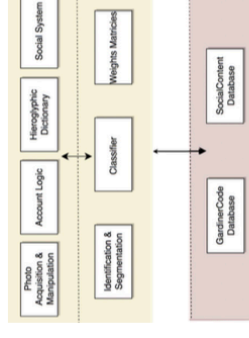
PEOPLE MISS OUT ON A LOT OF IMPORTANT INFORMATION AS THEY ARE UNABLE TO EASILY DECIPHER HIEROGLYPHIC, LEADING TO THE SLOW DECLINE OF KNOWLEDGE ABOUT THE PHAROAHs.

## The Solution



A FAST, PORTABLE, AND CONVENIENT MOBILE APPLICATION THAT ALLOWS USERS TO DETECT AND TRANSLATE HIEROGLYPHICS ANYWHERE, ANYTIME.

## The System



ON EACH APPLICATION, EACH FUNCTIONALITY IS SPLIT INTO ITS OWN VIEW WHETHER VISIBLE TO THE USER OR NOT. THESE INTERFACE TO THE SERVER WHICH INCLUDES THE TWO DATABASES. ONE CONTAINS SOCIAL CONTENT AND IS UTILIZED BY THE HISTORY AND SOCIAL FEED AND THE OTHER CONTAINS HIEROGLYPHIC INFORMATION SORTED BY GARDINER CODES USED BY THE HIEROGLYPHICS DICTIONARY AND TO PROVIDE MORE INFORMATION UPON CLASSIFICATION.

# DUA-KHETY

MALAK SADEK, MOHAMED BADRELDIN, MOHAMAD GHONEIM, AHMED EL-AGHA

THIS IS ACCOMPLISHED USING OPENCV BY

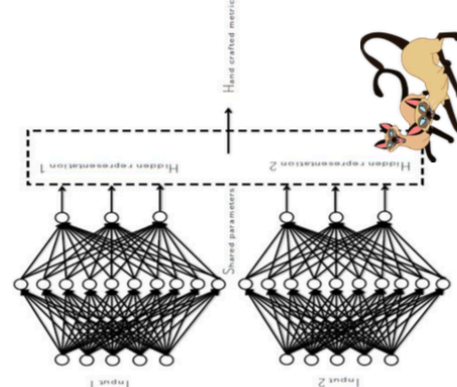
CONVERTING THE BITMAP TAKEN BY THE USER INTO A MAT OBJECT, TURNING IT TO BLACK AND WHITE AND THEN BLURRING THE IMAGE. AFTERWARDS, THE IMAGE IS THRESHOLDED. CANNY IS THEN APPLIED FOLLOWING THAT, THE COMPONENTS ARE EXTRACTED USING CONNECTED COMPONENTS AND ARE USED TO DRAW BOUNDING BOXES AROUND INDIVIDUAL HIEROGLYPHICS ON THE ORIGINAL IMAGE. THESE ARE THEN CROPPED AROUND AND PLACED IN AN ARRAY OF SMALLER IMAGES. THESE IMAGES ARE FROM THE ORIGINAL IMAGE AND SO THEY ARE MADE BLACK AND WHITE AND BINARIZED AGAIN BEFORE BEING FED TO THE CLASSIFIER FOR OPTIMAL RESULTS.



## Segmentation

A SIAMESE NETWORK IS USED. IT TAKES AS AN INPUT PAIRS OF IMAGES AND A LABEL REPRESENTING WHETHER THEY ARE FROM THE SAME CLASS OR NOT (DISPLAYED AS A 0 OR 1). THE IMAGES ARE CHOSEN RANDOMLY. RECENTLY, THIS CONCEPT HAS BEEN PROVEN TO BE HELPFUL IN PROBLEMS USING A LARGE NUMBER OF CLASSES WITH A SMALL NUMBER OF IMAGES FOR EACH CLASS. THE TRAINING IMAGES ARE FIRST FED THROUGH THE NETWORK AND A FEATURE VECTOR OF 640 VALUES IS EXTRACTED. AFTERWARDS, THE AVERAGE OF ALL THE VECTORS OF THE IMAGES IN A CLASS ARE COMPUTED AND STORED IN A COMMA SEPARATED VALUES (CSV) FILE. THIS OCCURS FOR ALL THE CLASSES (167). A NEW TEST IMAGE IS FED TO THE SAME NETWORK AND A FEATURE VECTOR OF 640 VALUES IS EXTRACTED FOR IT AS WELL. THE L1 DISTANCE BETWEEN ITS FEATURE VECTOR AND THE PREVIOUSLY EXTRACTED ONES FROM EACH CLASS IS CALCULATED, AND THE SMALLEST FIVE DISTANCES ARE TAKEN AS THE TOP FIVE PREDICTIONS.

**THE ACCURACY FOR THE TOP PREDICTION IS 66%, WHILE THE ACCURACY FOR THE TOP FIVE PREDICTIONS IS 88%.**



THE APPLICATION ALSO OFFERS EXTRA FEATURES ASIDE FROM DETECTING AND CLASSIFYING

- HIEROGLYPHICS. IT ALSO FEATURES: HIEROGLYPHICS DICTIONARY, WHICH ALLOWS USERS TO ENTER A GARDINER'S CODE AND RECEIVE INFORMATION ABOUT THE HIEROGLYPH IT REPRESENTS.
- A SEARCH HISTORY TO VIEW AND RE-ANALYZE PREVIOUS IMAGES.
- A SOCIAL FEED TO VIEW AND ANALYZE OTHER USERS' IMAGES AND SEARCH FOR IMAGES BY USERNAME OR ID CODE.
- A PHOTO SUBMISSION SYSTEM THAT ALLOWS USERS TO SEND THE DEVELOPERS IMAGES OF HIEROGLYPHS WITH THEIR GARDINER CODE AND DESCRIPTION TO IMPROVE THE CLASSIFIER AND THUS IMPROVE THE APP'S PERFORMANCE IN THE FUTURE.

## Extra Features

## Classification