



**CALIFORNIA STATE SCIENCE FAIR
2015 PROJECT SUMMARY**

Name(s) Ram S. Goli	Project Number S1407
Project Title Merging Machine Learning and Archaeology: Using an Artificial Neural Network to Predict the Implementation of Disk Beads	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals My objective is to create a computer algorithm that can accurately predict the implementation of a Clam Shell Disk Bead (CSDB) by recognizing patterns in predetermined beads, mainly patterns in the beads' diameter, thickness, and aperture. The algorithm should be able to predict whether a bead of unknown purpose is either a money bead or a basket bead.</p> <p>Methods/Materials I created an ANN in the Octave programming environment, and trained the network with data provided by archaeologist Katherine Dixon. I performed various network optimizing tasks such as plotting learning curves and validation curves, and testing different network structures to ensure that the network has the highest possible prediction accuracy on test data beads.</p> <p>Results The ANN I developed accurately predicts the implementation of %75.76 of beads given to the network (money bead or basket bead) by checking whether the implementation predicted by the network matched the predetermined implementation.</p> <p>Conclusions/Discussion It is possible to model CSDBs and predict their implementation with an Artificial Neural Network, but not with tremendously high accuracy. Due to many of the predetermined money and basket beads having similar measurements, the prediction accuracy of the network could not be substantially increased. However, my work will hopefully allow archaeologists to easily predict functions of beads collected at future digs, and lead to further bridging the fields of machine learning and archaeology.</p>	
Summary Statement In this project, I developed an artificial neural network to predict the implementation of clam shell disk beads found at archaeological sites.	
Help Received Archaeologist Katherine Dixon provided bead data	