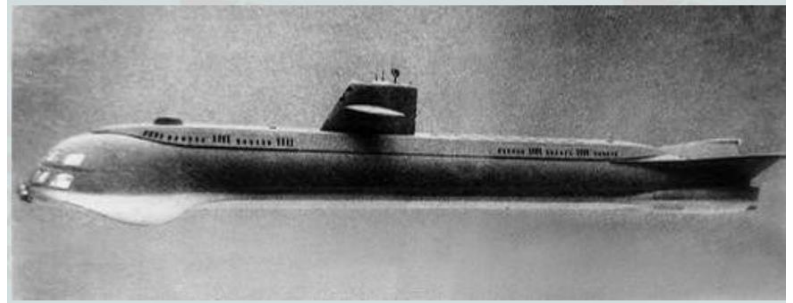


Project 3: Machine Learning Mine Versus Rock

You are the sonar operator on the SeaView Naval submarine. The path of your next mission will take you through an old mine field that has never been cleared. You know that your improbable Cobra shaped submarine is barely sea worthy and cannot stand a mine explosion. Experience tells you mines blowing up within 30 meters of the ship are a problem. These mines use magnetic detection to tell when a ship is near. You are concerned because the SeaView is particular vulnerable, and there is no good way to escape a submarine if it is stricken by a mine. (<http://vttbots.com/Page3.html>)



Given all this motivation you have some training data that may allow you to detect the difference between the mines and surrounding rocks. It is critical that you detect as many mines as possible. Your test data is in file `sonar_all_data_2.csv`, available in the project assignment. There you will find multiple observations of sonar data for mines and rocks each with 60 time samples which either indicate the presence of a mine (actually a hollow pipe) or a rock (actually a rock).

Try and document every method at your disposal to train using 70% of the data set to detect a mine versus a rock and then apply this to the 30% test dataset, as usual.

You can use the 60 time samples as 60 dependent variables but that is a lot so reduce this to an orthogonal dataset using Principle Component Analysis, PCA, before analysis.

Deliverables

- 1) Your python code which should be well organized and documented
- 2) The results of your prediction for each method using a principle component analysis reduced dataset
- 3) Write a one paragraph conclusion of this work containing reference to results, and conclusions you draw about the best method and your chances of surviving a real mine field using this analysis.