**Lesson Plan: Introduction to HyperPlanes**

**Rational:** When studying problems relating to multidimensional overlap, often the only data we have are individual point records, each with measured variables. So we can think of multivariate observations as points in multidimensional space (i.e. hyperspace), where each variable is an axis or dimension.

**Student Learning Objectives**

Students will….

1. Understand the structure of multivariate data
2. Explore multiple different ways of plotting the data
3. Use R run a an SVM

**Materials Needed for Lesson**

* Laptop

**Anticipatory Set up time** (5 min)

Gauge how comfortable students are with the material with a series of warm-up questions, for example:

1. What is data?
2. How do you classify observations?
3. How do you incorporate multiple different types of information into a single calculation?

**Direct instruction and guided practice**

Activity 1: Plotting multidimensional data in R

* 1. The bean data provides an opportunity to explore many different ways of plotting data
  2. Create plots of different variables
  3. Play with plot parameters (color, shapes, etc)

Activity 2: Use the package hypervolume

1. Using the hypervolume package conduct an SVM analysis
2. After working together walk through the code and try to understand what each portion is doing

**Independent Practice**

Annotate your own code so that in your own words you know what each command is doing.

**Output:** R-markdown document for initial SVM