

Contents

- [Vincent Purcell - HW 7 - ECE487](#)
- [Problem 6.1](#)
- [Functions Received From Textbook](#)
- [Generate Hyperplane Function](#)

Vincent Purcell - HW 7 - ECE487

```
clear; clc; close all;
```

Problem 6.1

Problem 6.1 from the Text on page 401.

```
X = generate_hyper([1;1],0,10,1,1000,0);
[pc,variances]=pcacov(cov(X'))
X_0 = pc(1,:)'.*X;

%Plot subplots
figure;
subplot(2,2,[1 3]); plot(X(1,:),X(2,:),'.b'); %X
title("Data");
xlabel("X_0");
ylabel("X_1");
xlim([-10 10])
ylim([-15 15])
subplot(2,2,[2 4]); plot(X_0(1,:),X_0(2,:),'.r'); %PCA
title("PCA");
xlabel("PC1");
ylabel("PC2");
xlim([-10 10])
ylim([-15 15])
sgtitle("Principal Component Analysis");
```

Functions Received From Textbook

The following functions were received from the Textbook
Pattern Recognition - Theodoridis, Koutroumbas

Generate Hyperplane Function

Adapted from page 399 of the text

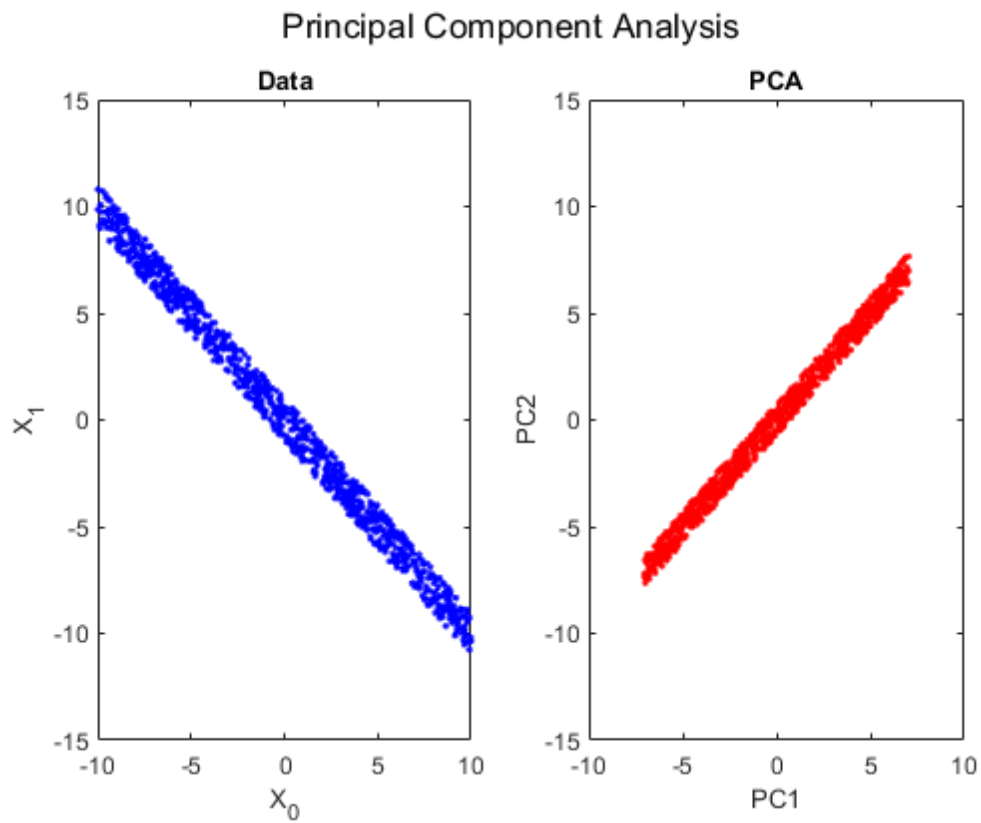
```
function X=generate_hyper(w,w0,a,e,N,sed)
    rng(sed);
    l=length(w);
    t=(rand(1-1,N)-.5)*2*a;
    t_last=-(w(1:l-1)/w(l))'*t + 2*e*(rand(1,N)-.5)-(w0/w(l));
    X=[t; t_last];
end
```

pc =

-0.7054	0.7088
0.7088	0.7054

variances =

64.3294
0.1624



Published with MATLAB® R2019b