Power Method

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1 Scatter Plots

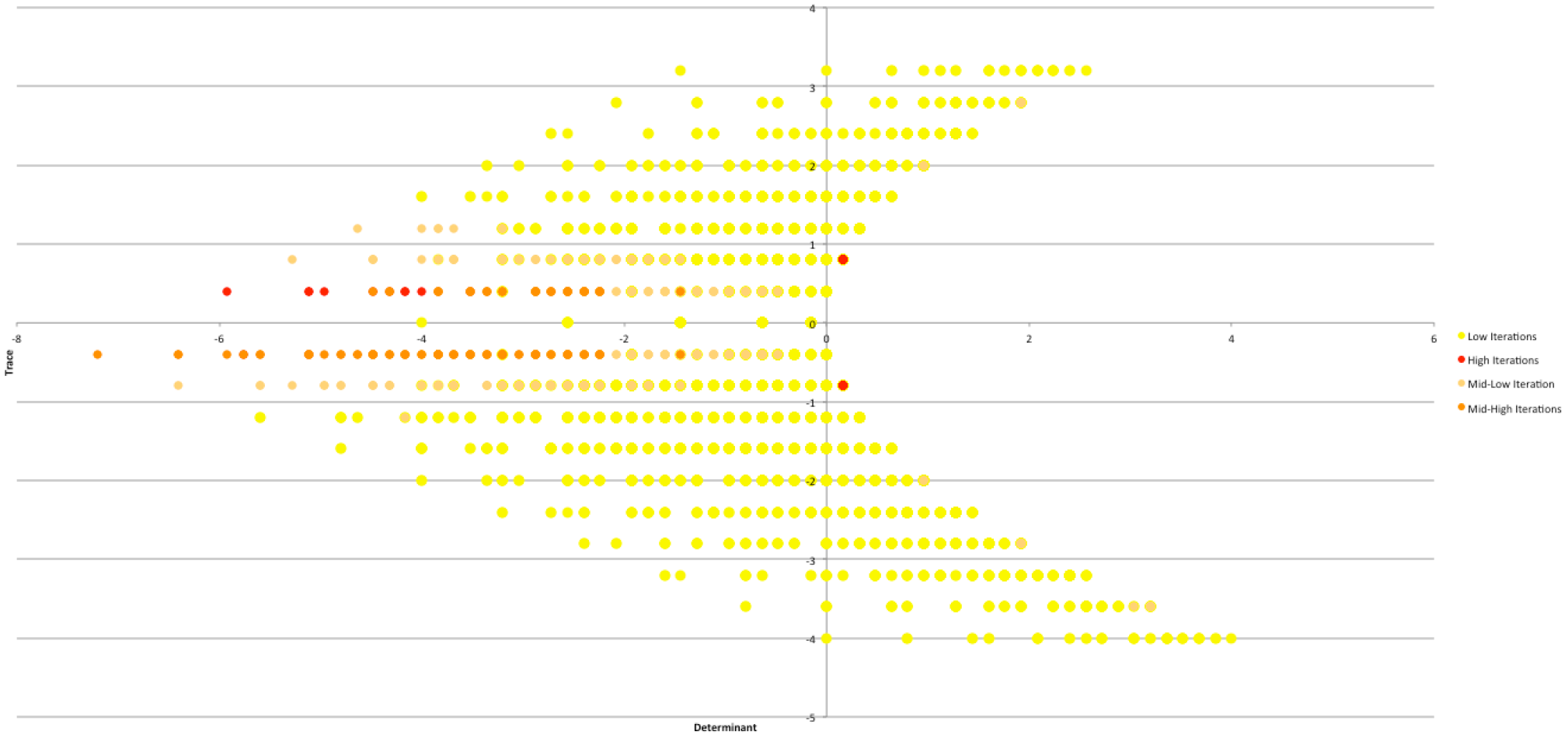
Refer to page 2 for the "Power Method Scatter Plot" and page 3 for the "Inverse Power Method Scatter Plot."

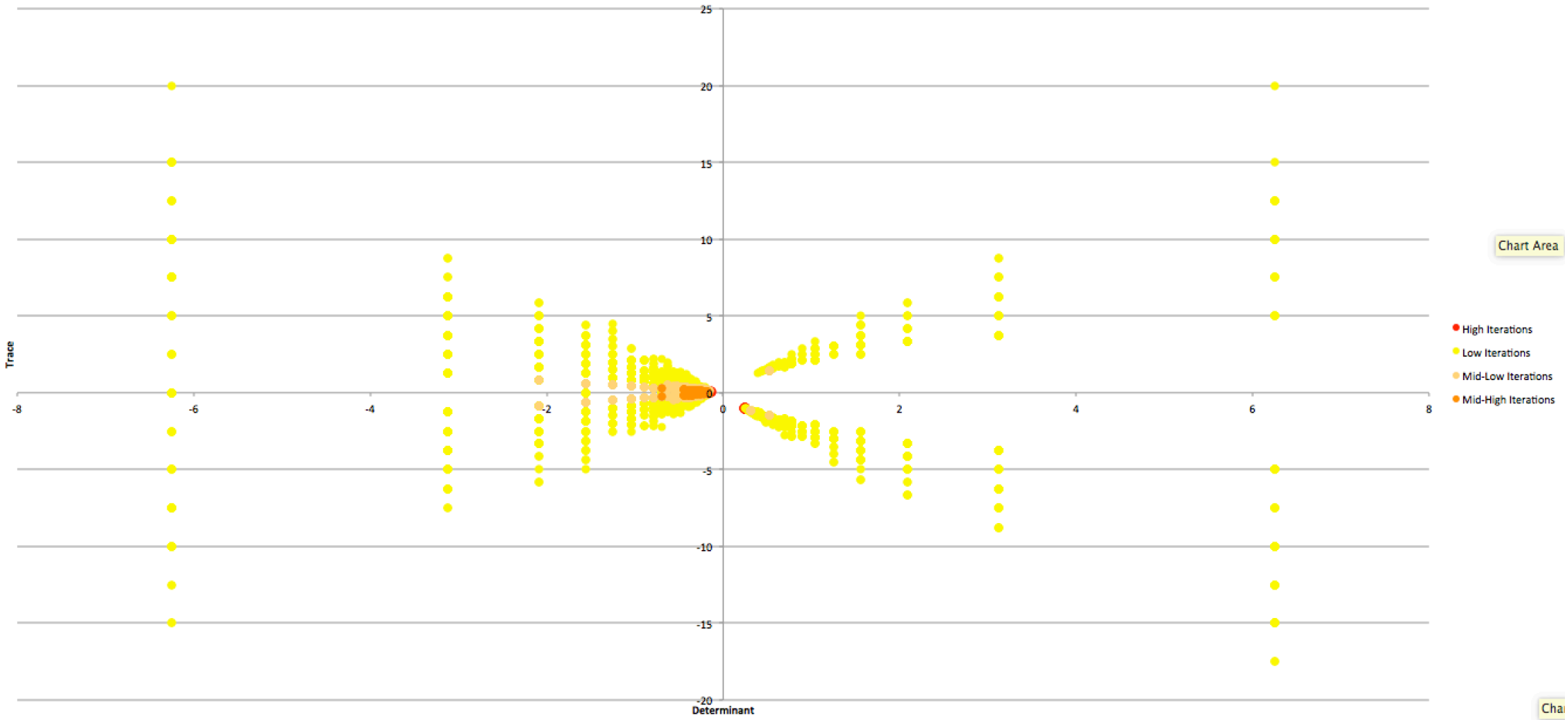
2 Scatter Plot Analysis

Both scatterplots tend to favor negative values for determinants. The shape of the "Power Method Scatter Plot" seems to be a sideways parabola. This indicates that as the determinant gets larger, the magnitude of the trace also grows.

The shape of the "Inverse Power Method Scatter Plot" appears to be very related. The equation for the trace of the inverse power method is as follows: $tr(A^{-1}) = tr(A)/det(A)$. The graph shows this relationship very clearly. The effect of this relationship is that the inverse power method graph is a heavily stretched version of the original. Additionally, it tends to bunch the matrices more than the original.

The position of the colors (number of iterations) is also related to the shape of the plots. The closer to 0 the trace is (in both plots) the more likely the power method will take many iterations. This makes sense because a matrix's trace is the sum of its eigenvalues. If a matrix's trace is very low, then it may have very low eigenvalues. This means that the algorithm will have to be run many times in order to achieve an answer within the threshold specified.


Trace
Determinant
4
3
2
1
0
-1
-2
-3
-4
-5
-8
-6
-4
-2
0
2
4
6
Low Iterations
High Iterations
Mid-Low Iteration
Mid-High Iterations


25
20
15
10
5
0
-5
-10
-15
-20
-8
-6
-4
-2
0
2
4
6
8
Trace
Determinant
Chart Area
High Iterations
Low Iterations
Mid-Low Iterations
Mid-High Iterations