计算机应用数学（上）

课程作业报告

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Homework 01: Polynomial Curve Fitting

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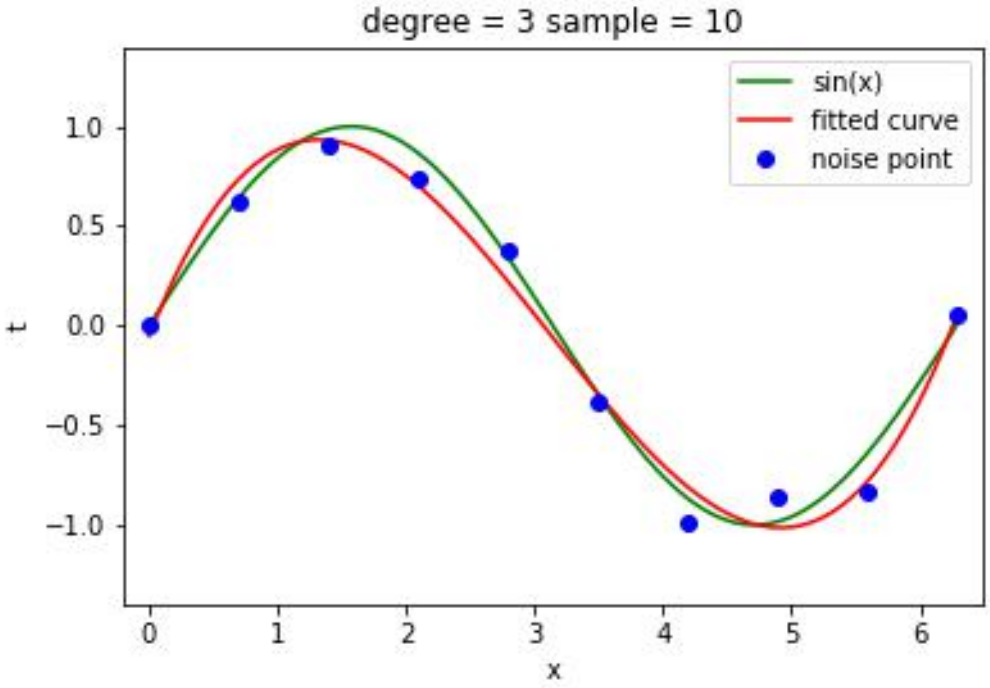
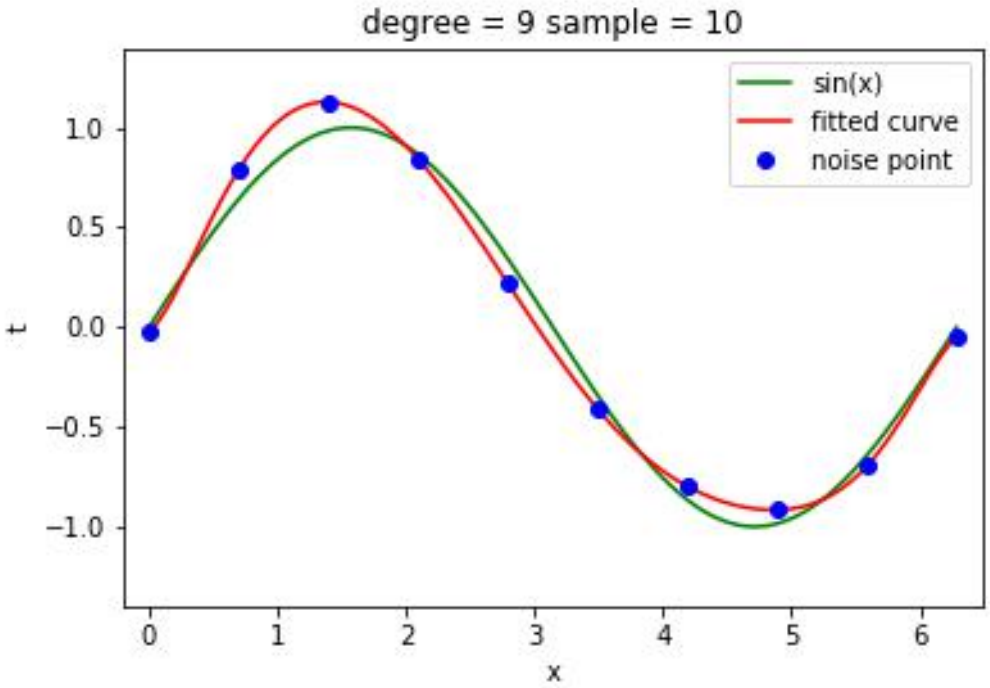
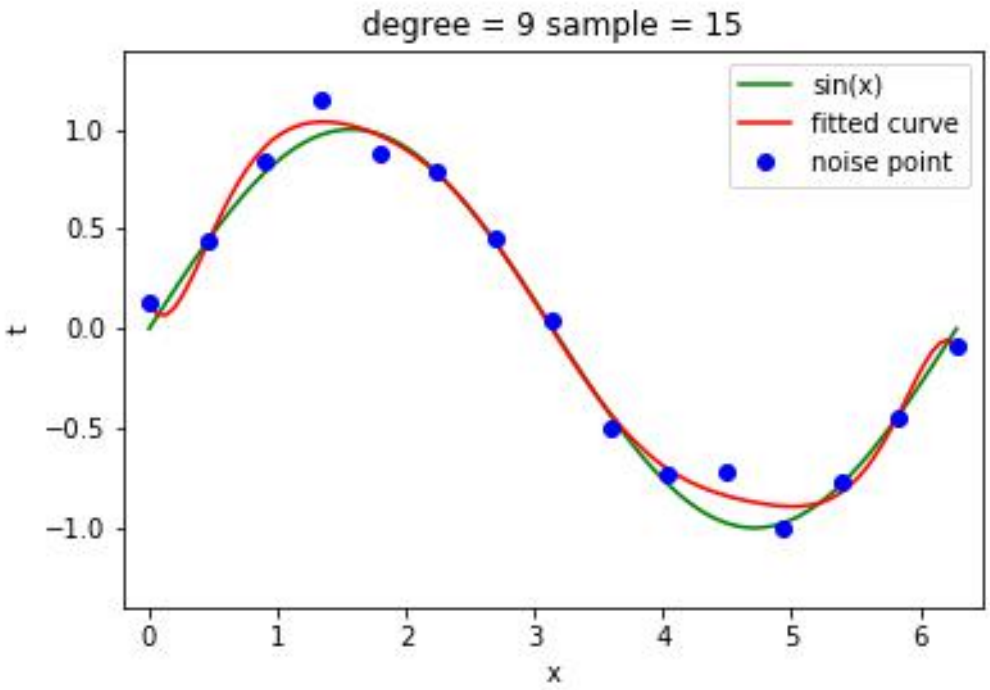
1.sample the function curve of y=sin(x) with Gaussian noise

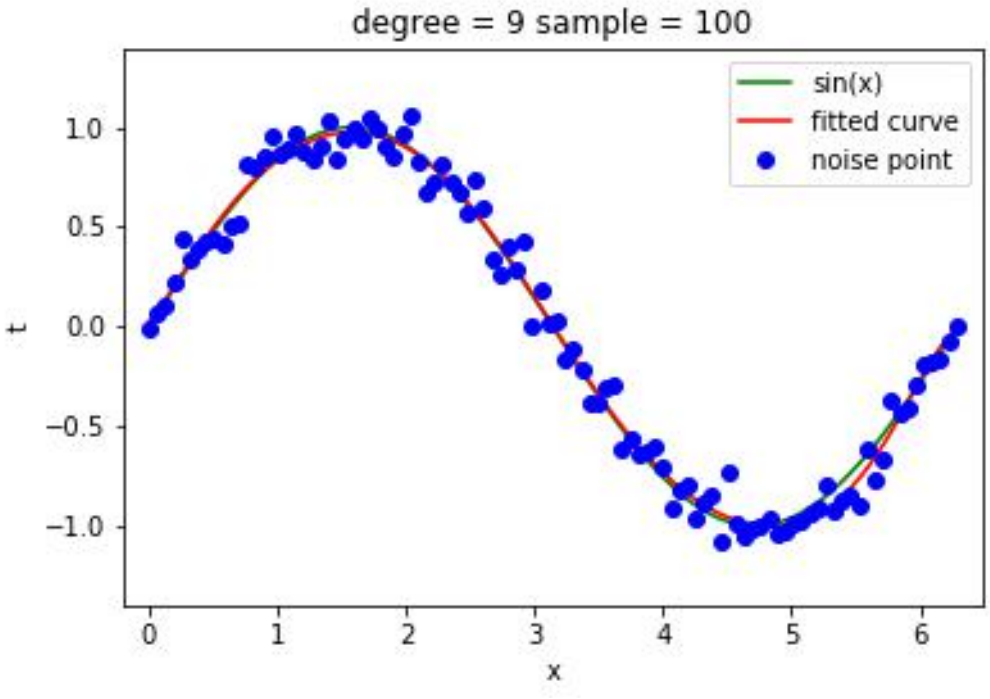


2.fit degree 3 and 9 curves in 10 samples

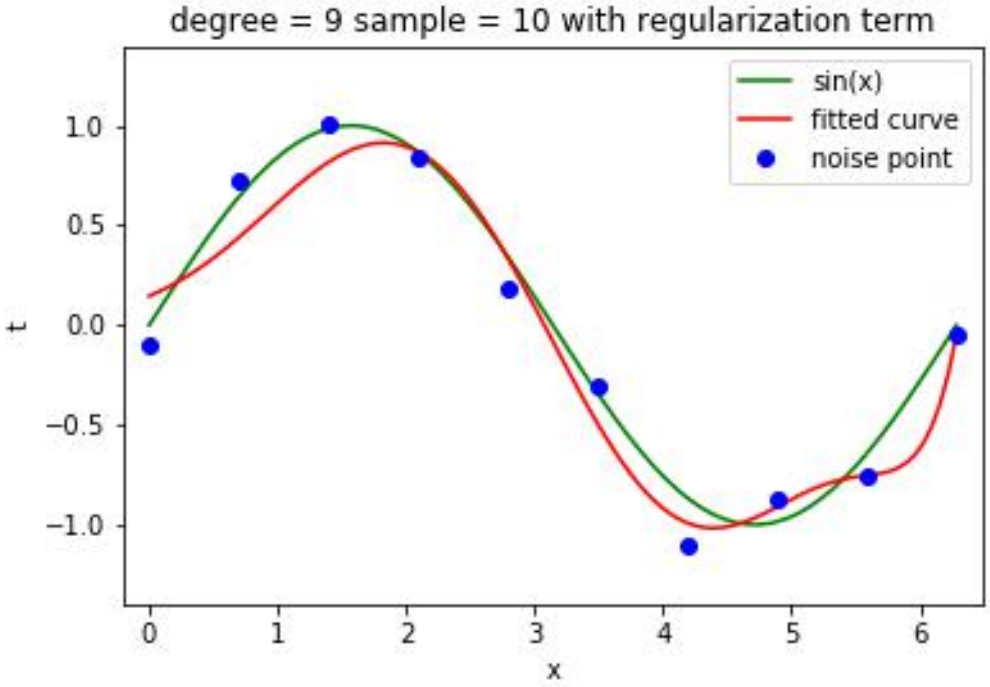


3.fit degree 9 curves in 15 and 100 samples





4.fit degree 9 curve in 10 samples but with regularization term


degree = 9 sample = 10 with regularization term
sin(x)
fitted curve
noise point
1.0
0.5
0.0
−0.5
−1.0
t
0
1
2
3
4
5
6
x

Homework 02: Represent digits '3' in 2D

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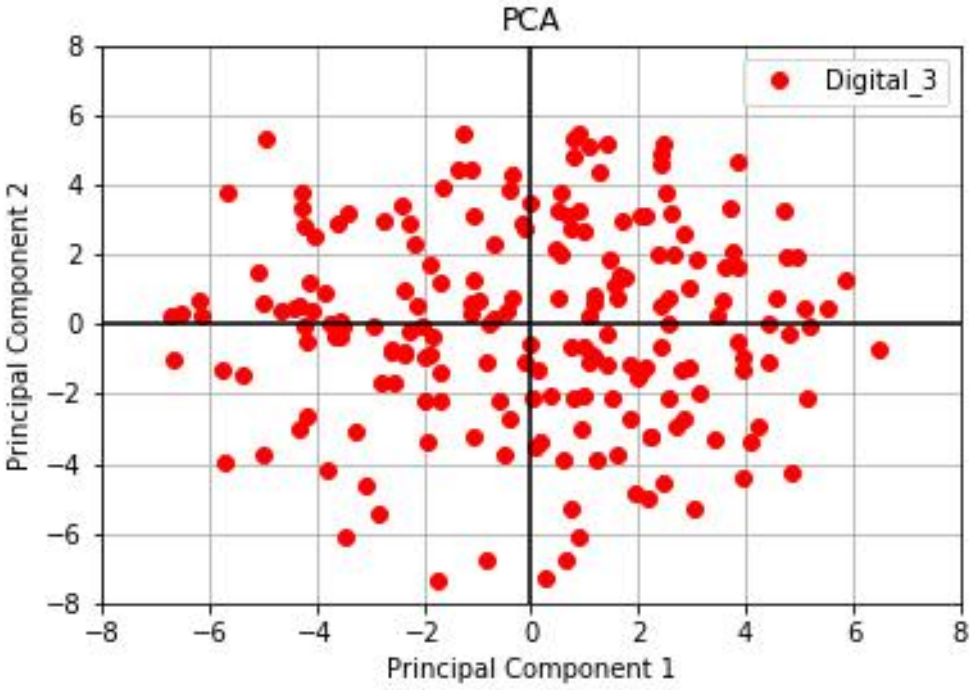
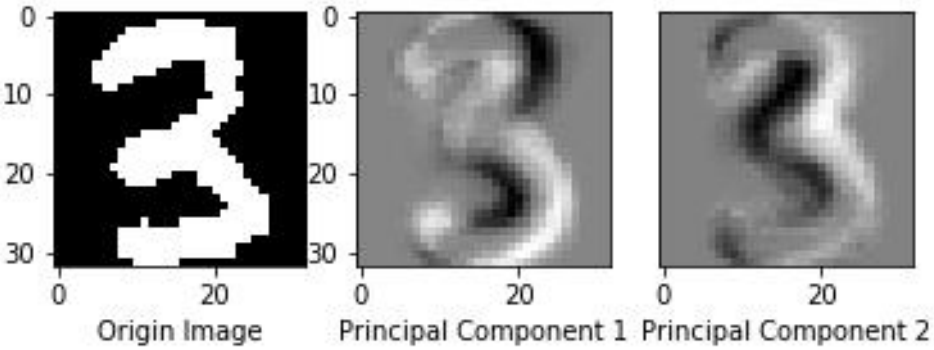
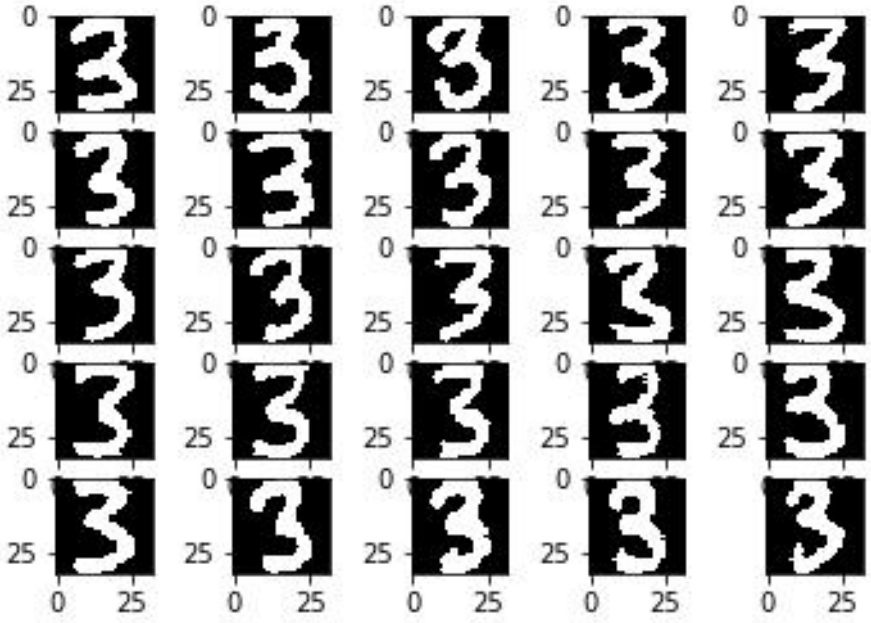
1.perform PCA over all digit '3' with 2 components

2.plot the PCA results as below






0
25
0
25

Homework 03: Mean-Shift Algorithm

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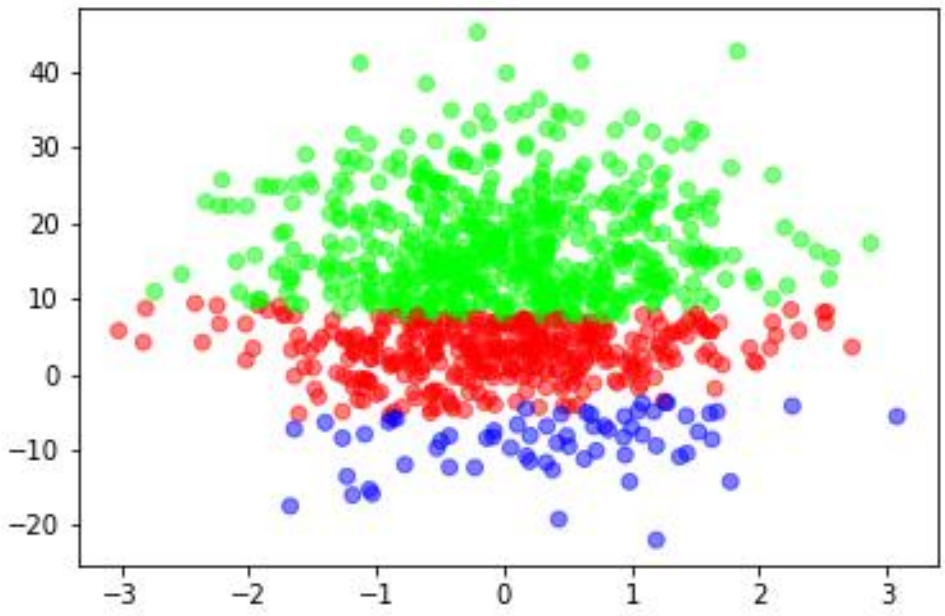
1.Experiment result



Homework 04: Levenberg-Marquardt Algorithm

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1.Test function

Function: f(x, y) = sin(xy) + cos(xy).

First-Order-Gradient:

f'(x, y) = [ycos(xy) - ysin(xy), xcos(xy) - xsin(xy)]

Second-Order-Gradient

f''(x, y) =

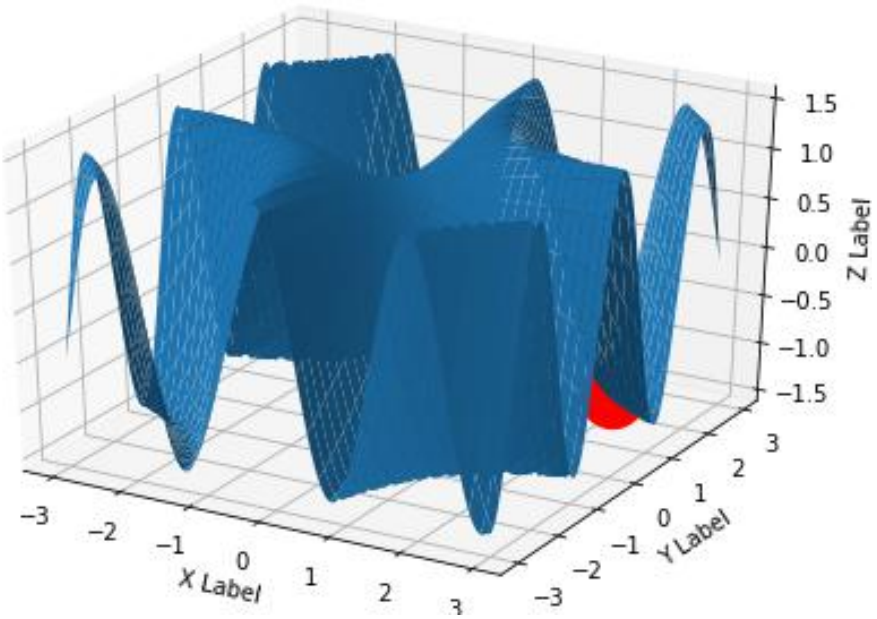
[-y^2sin(xy)-y^2cos(xy),

cos(xy)-xysin(xy)-sin(xy)-xycos(xy),

cos(xy)-xysin(xy)-sin(xy)-xycos(xy),

-x^2sin(xy)-x^2cos(xy)]

2.Plot the iteration steps



Homework 05: SVM

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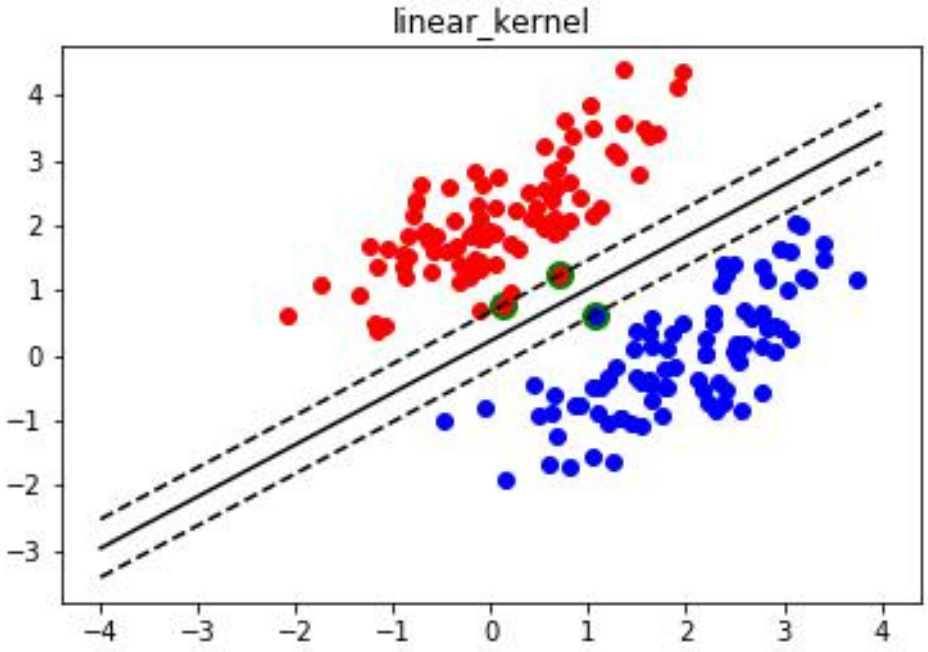
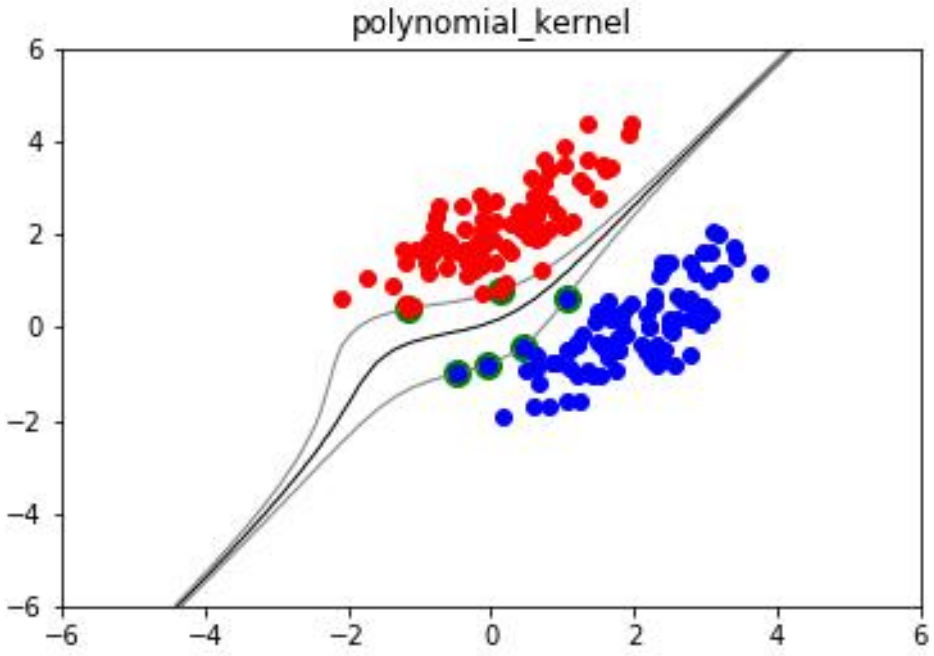
1.Linear kernel



2.Polynomial kernel



3.Gaussian kernel