CSCI 181 / E-181 Spring 2014 Practical 2

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Warm-Up

Maximum Likelihood Estimation

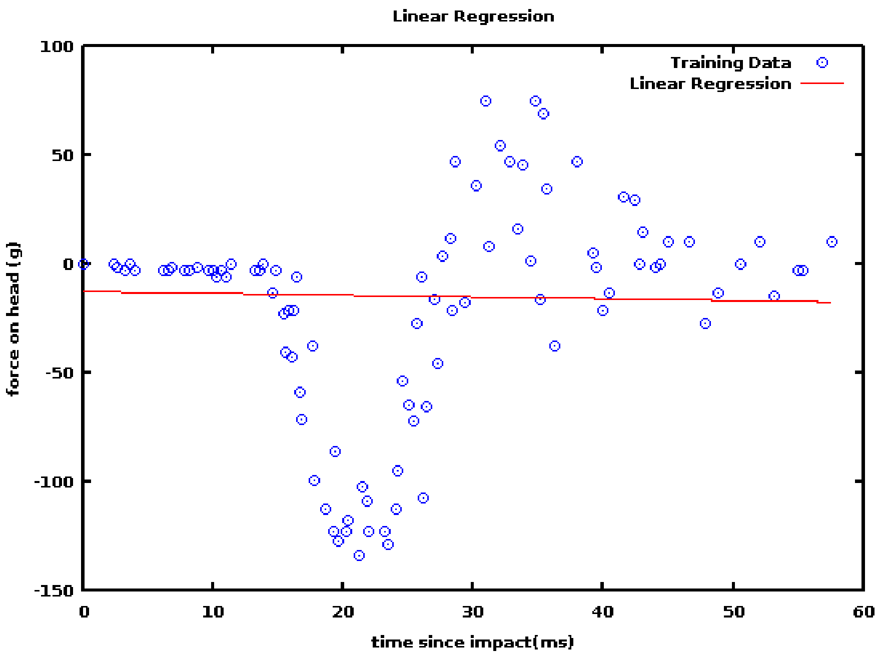

Figure 1: Warmup: Gradient Descent

As a baseline, we first a simple gradient descent. We also did a clearly overfit polynomial (using up to n^12).

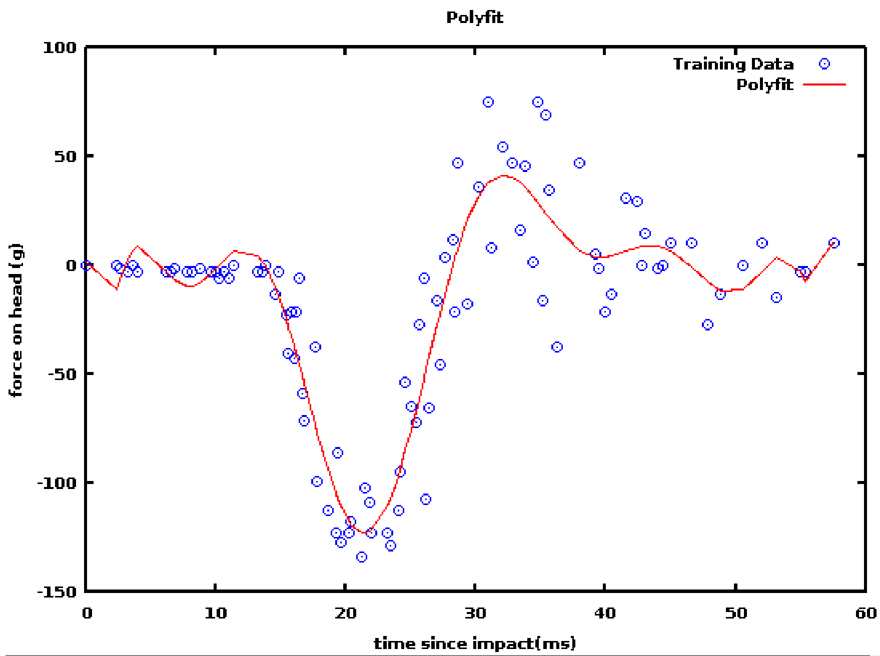

Figure 2: Warmup: Polynomial Fit n^{12}

Bayesian Linear Regression

Using Moore Penrose, we solved for w.

$$\mathbf{w}_{\mathrm{ML}} = \left(\boldsymbol{\Phi}^{\mathrm{T}}\boldsymbol{\Phi}\right)^{-1}\boldsymbol{\Phi}^{\mathrm{T}}\mathbf{t}$$

Figure 3: Warmup: Moore Penrose (closed form)

Locally Weighted Linear Regression

Locally weighted Linear Regression[1] provided the lowest cost overall and a smooth fit to the data without overfitting given the profile of this dataset. A variety of K values were attempted. 0.001 never converged. Values from 0.5, 1.0, 5.0 and 10.0 did converge with 1.0 seemingly providing the best balance between fit and smoothness.

[1] Machine Learning in Action by Peter Harrington. © 2012 ISBN 978-1617290183

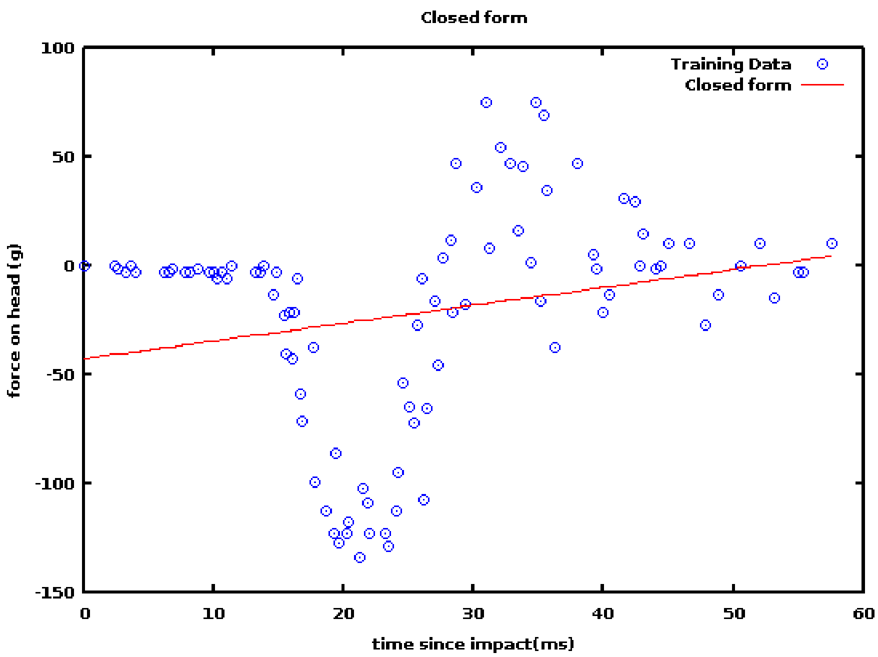

Figure 4: Warmup: Gaussian (closed form)

Method	Lowest Error
Gradient Descent	1293.0
Gaussian	1187.7
Polynomial	211.9
LWLR	185.6

Predicting Movie Opening Weekend Revenues

Subsection 1

Subsection 2

Conclusion

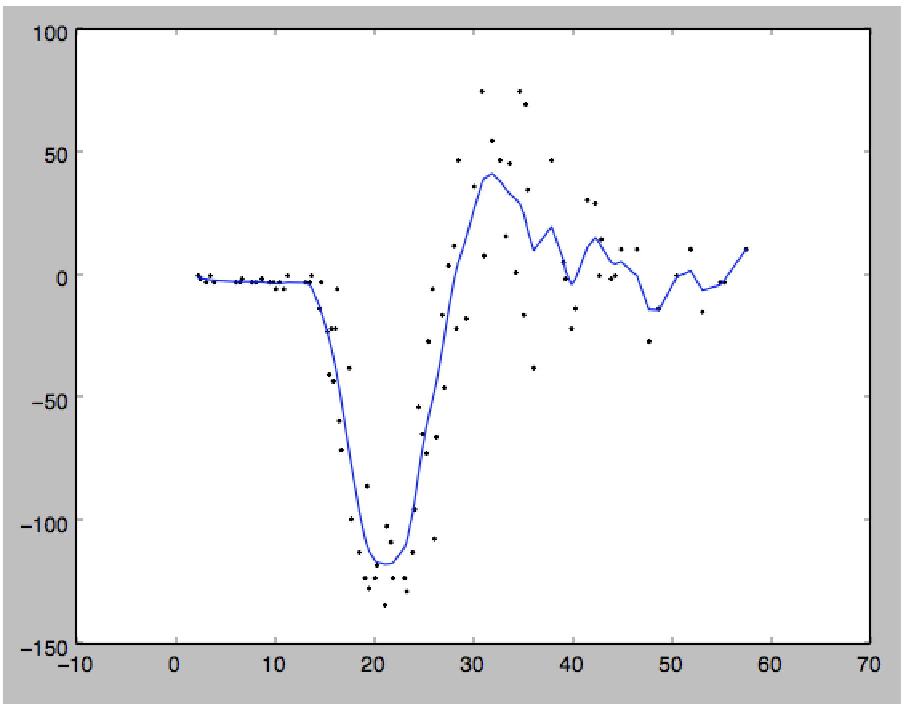

Figure 5: Warmup: Locally Weighted Linear Regression