Polynomial Regression

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Polynomial Regression Example

```
profsalary <- read.table("profsalary.txt", header = TRUE)

lm1 <- lm(Salary ~ Experience, data = profsalary)
plot(Salary ~ Experience, data = profsalary,
     xlab = 'Years of Experience', ylab = 'Years of Experience')
abline(lm1)
```

```r
plot(profsalary$Experience, resid(lm1),
     xlab = 'Years of Experience', ylab = 'Residuals')
abline(h = 0)
```

The graph above is a quadratic between the two variables.

```r
lm2 <- lm(Salary ~ Experience + I(Experience^2), data = profsalary)
summary(lm2)
```

```
Call:
lm(formula = Salary ~ Experience + I(Experience^2), data = profsalary)

Residuals:
    Min      1Q  Median      3Q     Max
-4.5786 -2.3573  0.0957  2.0171  5.5176

Coefficients:
                Estimate Std. Error t value Pr(>|t|)
(Intercept)     34.720498   0.828724   41.90   <2e-16 ***
Experience       2.872275   0.095697   30.01   <2e-16 ***
```

```
I(Experience^2) -0.053316   0.002477  -21.53   <2e-16 ***
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 2.817 on 140 degrees of freedom
Multiple R-squared:  0.9247,    Adjusted R-squared:  0.9236
F-statistic: 859.3 on 2 and 140 DF,  p-value: < 2.2e-16
```

```r
plot(profsalary$Experience, resid(lm2),
     xlab = 'Years of Experience', ylab = 'Residuals')
```

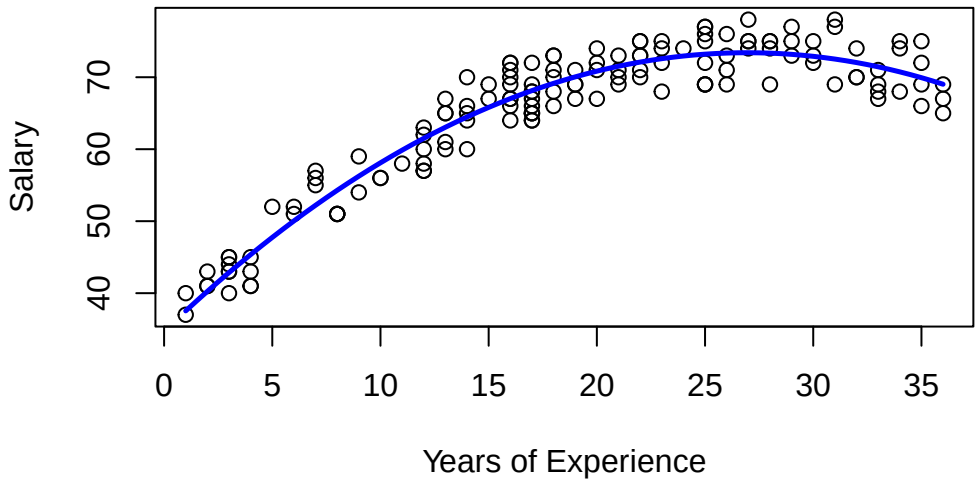

```r
x_new <- data.frame(Experience = 10)
predict(lm2, newdata = x_new, interval = 'prediction')
```

```
       fit      lwr      upr
1 58.11164 52.50481 63.71847
```

```r
range(profsalary$Experience)
```

```
[1]  1 36
```

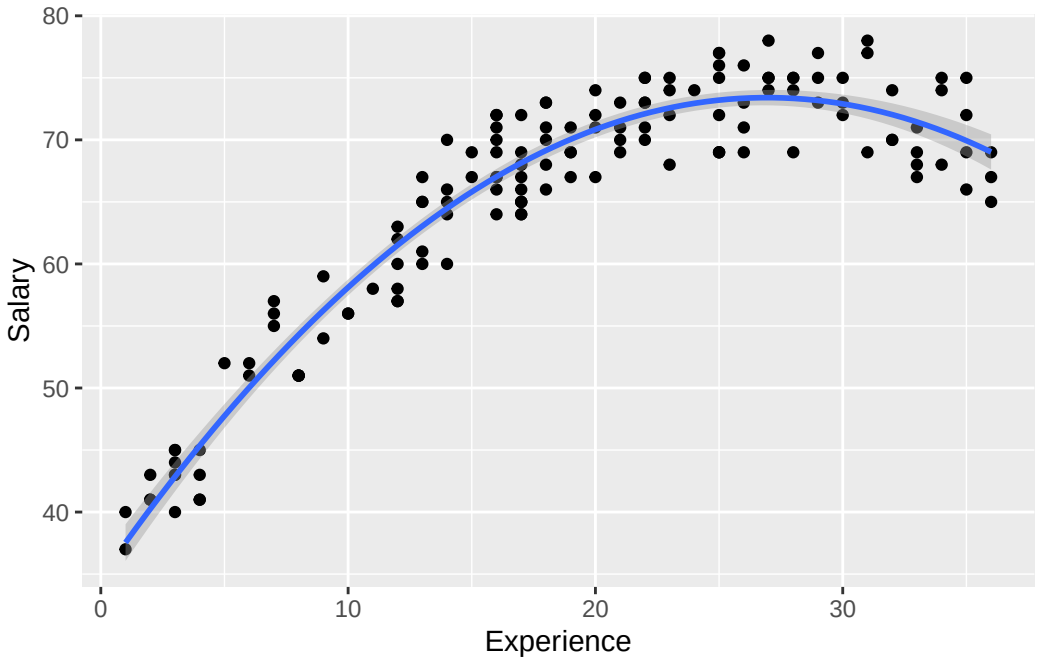
```
x_grd <- seq(1,36, by = 0.5)
x_new <- data.frame(Experience = x_grd)
preds <- predict(lm2, newdata = x_new)
plot(Salary ~ Experience, data = profsalary,
     ylab = 'Salary', xlab = 'Years of Experience')
lines(x_grd, preds, col = 'blue', lwd = 2.5)
```




```
library(ggplot2)
```

```
Warning: package 'ggplot2' was built under R version 4.2.3
```

```
ggplot(data = profsalary, aes(Experience, Salary)) +
  geom_point() +
  geom_smooth(method = 'lm', formula = y ~ poly(x,2))
```


80
70
60
50
40
Salary
0
10
20
30
Experience