# E07

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## 1.

Logistic Regression would be the appropriate ML paradigmn

## 2.

The one-vs-all approach would be the best way to process this data using logistic Regression

## 3.

Running for setosa, versicolor, and virginica produced varying results. The setosa model has a perfect apparent error rate of 0%. Versicolor had the worst model with an error rate of 33%. Virginica wasn't as good as setosa, but still acceptable with an error rate of 15%.

These error rates makes sense based on the graphs because versicolor and virginia features are interspersed while setosa clearly stands by itself.

I was able to slightly improve the apparent error rate by using a larger alpha value of `.1`. With this, the versicolor error rate decreased to 26% and the virginica 4%. The setosa remained at 0%. ## Setosa 1000 2000 3000 4000 5000 6000 7000 8000 9000 10000 Predictive model: -0.6610312579769989 + -0.5858344091553398 *(x1) + 0.4271317907955585* (x2) + -1.0126948520776395 *(x3) + -1.0292240741489398* (x4) Test: predicted 0 was 0 Test: predicted 0 was 0 Test: predicted 1 was 1 Test: predicted 0 was 0 Test: predicted 0 was 0 Test: predicted 0 was 0 Test: predicted 0 was 0 Test: predicted 0 was 0 Test: predicted 0 was 0 Test: predicted 0 was 0 Test: predicted 1 was 1 Test: predicted 0 was 0 Test: predicted 0 was 0 Test: predicted 0 was 0 Test: predicted 0 was 0 Test: predicted 0 was 0 Test: predicted 1 was 1 Test: predicted 1 was 1 Test: predicted 0 was 0 Test: predicted 1 was 1 Test: predicted 0 was 0 Test: predicted 1 was 1 Test: predicted 1 was 1 Test: predicted 0 was 0 Test: predicted 1 was 1 Test: predicted 0 was 0 Test: predicted 0 was 0 Test: predicted 0 was 0 Test: predicted 0 was 0 Test: predicted 0 was 0 Test: predicted 1 was 1 Test: predicted 0 was 0 Test: predicted 1 was 1 Test: predicted 0 was 0 Test: predicted 1 was 1 Test: predicted 1 was 1 Test: predicted 1 was 1 Test: predicted 1 was 1 Test: predicted 1 was 1 Test: predicted 0 was 0 Test: predicted 0 was 0 Test: predicted 1 was 1 Test: predicted 0 was 0 Test: predicted 0 was 0 Test: predicted 1 was 1 Test: predicted 0 was 0 Test: predicted 0 was 0 Test: predicted 0 was 0 Test: predicted 1 was 1 Test: predicted 0 was 0 Test: predicted 0 was 0 Test: predicted 1 was 1 Test: predicted 0 was 0 Test: predicted 0 was 0 Test: predicted 0 was

0 Test: predicted 0 was 0 Test: predicted 1 was 1 Test: predicted 0 was 0 Test: predicted 0 was 0 Test: predicted 0 was 0 Test: predicted 0 was 0 Test: predicted 0 was 0 Test: predicted 1 was 1 Test: predicted 0 was 0 Test: predicted 1 was 1 Test: predicted 1 was 1 Test: predicted 1 was 1 Test: predicted 1 was 1 Test: predicted 1 was 1 Test: predicted 1 was 1 Test: predicted 0 was 0 Test: predicted 1 was 1 Test: predicted 0 was 0 Test: predicted 1 was 1 Test: predicted 1 was 1 Test: predicted 0 was 0 Test: predicted 1 was 1 Test: predicted 1 was 1 Test: predicted 0 was 0 Test: predicted 0 was 0 Test: predicted 0 was 0 Test: predicted 1 was 1 Test: predicted 0 was 0 Test: predicted 0 was 0 Test: predicted 0 was 0 Test: predicted 0 was 0 Test: predicted 0 was 0 Test: predicted 0 was 0 Test: predicted 0 was 0 Test: predicted 1 was 1 Test: predicted 1 was 1 Test: predicted 0 was 0 Test: predicted 0 was 0 Test: predicted 0 was 0 Test: predicted 0 was 0 Test: predicted 0 was 0 Test: predicted 0 was 0 Test: predicted 0 was 0 Test: predicted 1 was 1 Test: predicted 0 was 0 Test: predicted 0 was 0 Test: predicted 1 was 1 Test: predicted 1 was 1 Test: predicted 0 was 0 Test: predicted 0 was 0 Test: predicted 0 was 0 Test: predicted 0 was 0 Test: predicted 0 was 0 Test: predicted 0 was 0 Test: predicted 0 was 0 Test: predicted 0 was 0 Test: predicted 0 was 0 Test: predicted 0 was 0 Test: predicted 0 was 0 Test: predicted 0 was 0 Test: predicted 0 was 0 Test: predicted 0 was 0 Test: predicted 0 was 0 Test: predicted 1 was 1 Test: predicted 1 was 1 Test: predicted 0 was 0 Test: predicted 1 was 1 Test: predicted 1 was 1 Test: predicted 0 was 0 Test: predicted 1 was 1 Test: predicted 0 was 0 Test: predicted 1 was 1 Test: predicted 1 was 1 Test: predicted 1 was 1 Test: predicted 0 was 0 Test: predicted 0 was 0 Test: predicted 1 was 1 Test: predicted 0 was 0 Test: predicted 0 was 0 Test: predicted 0 was 0 Test: predicted 1 was 1 Test: predicted 0 was 0 Test: predicted 0 was 0 Test: predicted 0 was 0 Test: predicted 1 was 1 Test: predicted 0 was 0 Test: predicted 0 was 0 Test: predicted 0 was 0 Test: predicted 0 was 0 Test: predicted 0 was 0 Test: predicted 0 was 0 Test: predicted 1 was 1 Test: predicted 0 was 0 Errors: 0.0

## Versicolor

```
1000
2000
3000
4000
5000
6000
7000
8000
9000
10000
Predictive model:  -0.6258815088394731 + 0.053536427714677766 *(x1) + -0.3704194462365333 *(
Test: predicted 0 was 1
Test: predicted 0 was 0
Test: predicted 0 was 0
```

```
Test: predicted 0 was 1
Test: predicted 0 was 1
Test: predicted 0 was 0
Test: predicted 0 was 0
Test: predicted 0 was 0
Test: predicted 0 was 0
Test: predicted 0 was 1
Test: predicted 0 was 0
Test: predicted 0 was 1
Test: predicted 0 was 1
Test: predicted 0 was 0
Test: predicted 0 was 1
Test: predicted 0 was 0
Test: predicted 0 was 0
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Test: predicted 0 was 0
Test: predicted 0 was 0
Test: predicted 0 was 1
Test: predicted 0 was 1
Test: predicted 0 was 0
Test: predicted 0 was 0
Test: predicted 0 was 0
Test: predicted 0 was 0
Test: predicted 0 was 0
Test: predicted 0 was 1
Test: predicted 0 was 0
Test: predicted 0 was 0
Test: predicted 0 was 0
Test: predicted 0 was 0
Test: predicted 0 was 1
Test: predicted 0 was 0
Test: predicted 0 was 1
```

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Test: predicted 0 was 1
Test: predicted 0 was 0
Test: predicted 0 was 0
Test: predicted 0 was 0
Test: predicted 0 was 0
Test: predicted 0 was 0
Test: predicted 0 was 1
Test: predicted 0 was 1
Test: predicted 0 was 1
Test: predicted 0 was 1
Test: predicted 0 was 1
Test: predicted 0 was 0
Test: predicted 0 was 0
Test: predicted 0 was 0
Test: predicted 0 was 0
Test: predicted 0 was 0
Test: predicted 0 was 0
Test: predicted 0 was 1
Test: predicted 0 was 0
Test: predicted 0 was 0
Test: predicted 0 was 0
Test: predicted 0 was 0
Test: predicted 0 was 1
Test: predicted 0 was 0
Test: predicted 0 was 0
Test: predicted 0 was 0
Test: predicted 0 was 0
Test: predicted 0 was 1
Test: predicted 0 was 0
Test: predicted 0 was 0
Test: predicted 0 was 0
Test: predicted 0 was 0
Test: predicted 0 was 0
Test: predicted 0 was 0
Test: predicted 0 was 0
Test: predicted 0 was 0
Test: predicted 0 was 0
Test: predicted 0 was 0
Test: predicted 0 was 0
Test: predicted 0 was 1
Test: predicted 0 was 1
Test: predicted 0 was 0
Test: predicted 0 was 1
Test: predicted 0 was 1
Test: predicted 0 was 0
Test: predicted 0 was 0
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Test: predicted 0 was 1
Test: predicted 0 was 1
Test: predicted 0 was 0
Test: predicted 0 was 0
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Test: predicted 0 was 0
Test: predicted 0 was 0
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Test: predicted 0 was 1
Test: predicted 0 was 0
Test: predicted 0 was 0
Test: predicted 0 was 0
Test: predicted 0 was 0
Test: predicted 0 was 1
Test: predicted 0 was 0
Test: predicted 0 was 0
Test: predicted 0 was 1
Test: predicted 0 was 1
Test: predicted 0 was 0
Test: predicted 0 was 0
Test: predicted 0 was 0
Test: predicted 0 was 0
Test: predicted 0 was 0
Test: predicted 0 was 0
Test: predicted 0 was 1
Test: predicted 0 was 0
Test: predicted 0 was 0
Test: predicted 0 was 1
Test: predicted 0 was 1
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Test: predicted 0 was 0
Test: predicted 0 was 0
Test: predicted 0 was 0
Test: predicted 0 was 1
Test: predicted 0 was 1
Test: predicted 0 was 1
Test: predicted 0 was 0
Test: predicted 0 was 0
Test: predicted 0 was 0
Test: predicted 0 was 1
Test: predicted 0 was 0
Test: predicted 0 was 0
Test: predicted 0 was 0
Test: predicted 0 was 1
Test: predicted 0 was 1
Test: predicted 0 was 0
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Test: predicted 0 was 0
Test: predicted 0 was 0
Test: predicted 0 was 0
Test: predicted 0 was 1
Test: predicted 0 was 0
Test: predicted 0 was 0
Test: predicted 0 was 1
Test: predicted 0 was 0
Test: predicted 0 was 0
Errors: 0.3333333333333333
```

## Virginica

```
1000
2000
3000
4000
5000
6000
7000
8000
9000
10000
Predictive model:  -0.6524756861990624 + 0.5310873184122441 *(x1) + -0.06370336986544228 *(x
Test: predicted 1 was 1
Test: predicted 0 was 0
Test: predicted 0 was 0
Test: predicted 0 was 0
Test: predicted 1 was 1
Test: predicted 0 was 0
Test: predicted 1 was 1
Test: predicted 0 was 0
Test: predicted 0 was 0
Test: predicted 0 was 1
Test: predicted 0 was 0
Test: predicted 0 was 0
Test: predicted 0 was 0
Test: predicted 0 was 0
Test: predicted 1 was 1
Test: predicted 0 was 1
Test: predicted 0 was 0
Test: predicted 0 was 0
Test: predicted 0 was 0
Test: predicted 0 was 0
Test: predicted 1 was 1
Test: predicted 0 was 0
```

```
Test: predicted 0 was 0
Test: predicted 0 was 1
Test: predicted 1 was 1
Test: predicted 0 was 0
Test: predicted 1 was 1
Test: predicted 0 was 0
Test: predicted 0 was 0
Test: predicted 0 was 0
Test: predicted 0 was 0
Test: predicted 0 was 0
Test: predicted 0 was 0
Test: predicted 0 was 0
Test: predicted 0 was 0
Test: predicted 0 was 0
Test: predicted 0 was 0
Test: predicted 0 was 0
Test: predicted 0 was 0
Test: predicted 1 was 1
Test: predicted 0 was 1
Test: predicted 0 was 0
Test: predicted 0 was 1
Test: predicted 0 was 0
Test: predicted 0 was 0
Test: predicted 1 was 1
Test: predicted 0 was 0
Test: predicted 0 was 0
Test: predicted 0 was 0
Test: predicted 0 was 0
Test: predicted 1 was 1
Test: predicted 0 was 1
Test: predicted 1 was 1
Test: predicted 0 was 1
Test: predicted 0 was 0
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Test: predicted 1 was 1
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Test: predicted 0 was 0
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Test: predicted 0 was 1
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Test: predicted 1 was 1
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Test: predicted 0 was 0
Test: predicted 1 was 1
Test: predicted 0 was 0
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Test: predicted 0 was 0
Test: predicted 0 was 0
Test: predicted 1 was 1
Test: predicted 0 was 0
Test: predicted 0 was 0
Test: predicted 0 was 0
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Test: predicted 0 was 0
Test: predicted 0 was 1
Test: predicted 0 was 0
Test: predicted 1 was 1
Test: predicted 1 was 1
Test: predicted 0 was 0
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Test: predicted 0 was 0
Test: predicted 0 was 1
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Test: predicted 0 was 0
Test: predicted 0 was 0
Test: predicted 1 was 1
Test: predicted 0 was 0
Test: predicted 0 was 1
Test: predicted 0 was 0
Test: predicted 0 was 0
Test: predicted 0 was 0
Test: predicted 0 was 0
Test: predicted 1 was 1
Test: predicted 0 was 0
Test: predicted 0 was 0
Test: predicted 1 was 1
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Test: predicted 0 was 0
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Test: predicted 0 was 0
Test: predicted 1 was 1
Test: predicted 0 was 1
Test: predicted 0 was 0
Test: predicted 0 was 0
Test: predicted 0 was 1
Test: predicted 0 was 0
Test: predicted 0 was 1
Test: predicted 0 was 0
Test: predicted 0 was 1
Test: predicted 0 was 0
Test: predicted 0 was 0
Test: predicted 0 was 0
Test: predicted 0 was 1
Test: predicted 0 was 0
Test: predicted 0 was 1
Test: predicted 0 was 0
Test: predicted 0 was 0
Test: predicted 0 was 0
Test: predicted 0 was 0
Test: predicted 0 was 0
Test: predicted 1 was 1
Test: predicted 1 was 1
Test: predicted 0 was 0
Test: predicted 0 was 0
Test: predicted 0 was 0
Test: predicted 0 was 1
Test: predicted 0 was 0
Errors: 0.15333333333333332
```