

Generalized Additive Models (GAMs)

CMDA 4654 Project 2

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Generalized Additive Models



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Replying to @millerdl

140 char vrsn

- 1 GAMs are just GLMs
- 2 GAMs fit wiggly terms
- 3 use + s(foo) not foo in frmla
- 4 use method = "REML"
- 5 gam.check()

2:37 PM · Mar 16, 2017 · TweetDeck

Generalized Additive Models

- Type of generalized linear model
- Response variable depends on smooth functions $f_i(x_i)$
- General structure of a GAM:
$$g(E(Y)) = \beta_0 + f_1(x_1) + f_2(x_2) + \cdots + f_n(x_n)$$
- Smooth functions can be many different things (polynomials, splines, weighted means, etc)

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The main package used for GAMs is mgcv.

**Mixed GAM Computation Vehicle with Automatic
Smoothness Estimation**



Example - iris

```
data("iris")
```

Example - iris

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Example - iris

Example - mtcars

```
data("mtcars")
mtcars_gam <-
  gam(mpg ~ s(displ), data = mtcars, method = "REML")
summary(mtcars_gam)
```

Family: gaussian
Link function: identity

Formula:
mpg ~ s(displ)

Parametric coefficients:

	Estimate	Std. Error	t value	Pr(> t)
(Intercept)	20.0906	0.3788	53.04	<2e-16 ***

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Approximate significance of smooth terms:

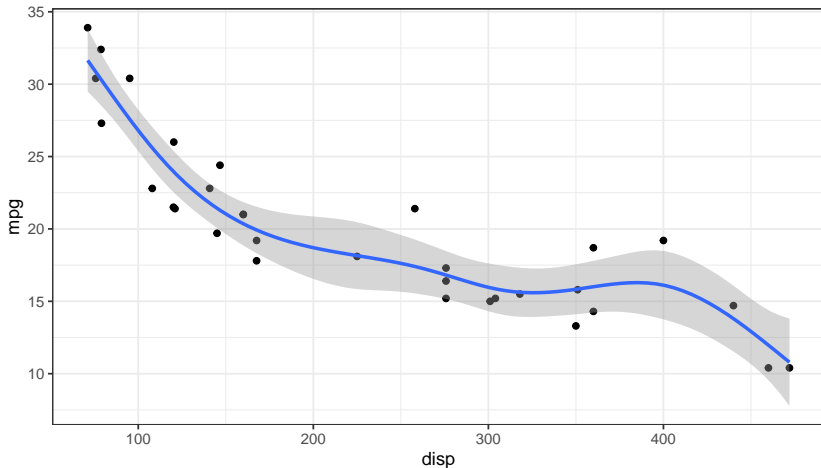
	edf	Ref.df	F	p-value
s(displ)	4.884	5.904	36.3	<2e-16 ***

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

R-sq.(adj) = 0.874 Deviance explained = 89.4%
-REML = 74.101 Scale est. = 4.5918 n = 32

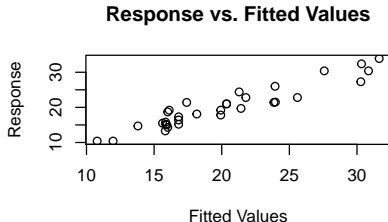
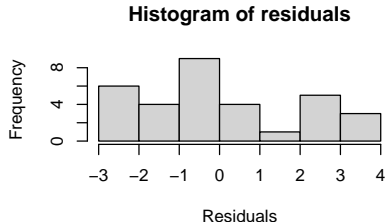
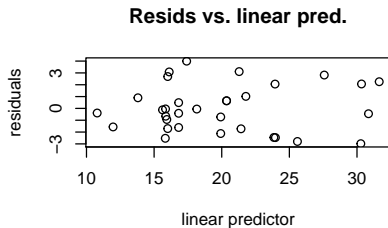
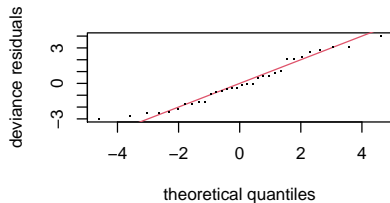
Example - mtcars

```
ggplot(data = mtcars, aes(x = disp, y = mpg)) +  
  theme_bw() + geom_point() +  
  geom_smooth(method = "gam", formula = y ~ s(x))
```



Example - mtcars

```
gam.check(mtcars_gam)
```



Example - mtcars

Example - Health Data

```
# df <- read.csv('health_data.csv')  
# show the data
```

Example - Health Data

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Conclusion

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References