

Train and Test



OLS Regression Results

Dep. Variable:	DomesticTotalGross	R-squared:	0.286
Model:	OLS	Adj. R-squared:	0.278
Method:	Least Squares	F-statistic:	34.82
Date:	Sun, 14 Sep 2014	Prob (F-statistic):	6.80e-08
Time:	21:59:46	Log-Likelihood:	-1738.1
No. Observations:	89	AIC:	3480.
Df Residuals:	87	BIC:	3485.
Df Model:	1		

	coef	std err	t	P> t 	[95.0% Conf. Int.]
Budget	0.7846	0.133	5.901	0.000	0.520 1.049
Ones	4.44e+07	1.27e+07	3.504	0.001	1.92e+07 6.96e+07

Omnibus:	39.749	Durbin-Watson:	0.674
Prob(Omnibus):	0.000	Jarque-Bera (JB):	99.441
Skew:	1.587	Prob(JB):	2.55e-22
Kurtosis:	7.091	Cond. No.	1.54e+08

Data sets

	Date	Title	Budget	DomesticTotalGross	Director	Rating	Runtime
0	2013-11-22	The Hunger Games: Catching Fire	130000000	424668047	Francis Lawrence	PG-13	146
1	2013-05-03	Iron Man 3	200000000	409013994	Shane Black	PG-13	129
2	2013-11-22	Frozen	150000000	400738009	Chris BuckJennifer Lee	PG	108
3	2013-07-03	Despicable Me 2	76000000	368061265	Pierre CoffinChris Renaud	PG	98
4	2013-06-14	Man of Steel	225000000	291045518	Zack Snyder	PG-13	143
5	2013-10-04	Gravity	100000000	274092705	Alfonso Cuaron	PG-13	91
6	2013-06-21	Monsters University	NaN	268492764	Dan Scanlon	G	107
7	2013-12-13	The Hobbit: The Desolation of Smaug	NaN	258366855	Peter Jackson	PG-13	161
8	2013-05-24	Fast & Furious 6	160000000	238679850	Justin Lin	PG-13	130
9	2013-03-08	Oz The Great and Powerful	215000000	234911825	Sam Raimi	PG	127
10	2013-05-16	Star Trek Into Darkness	190000000	228778661	J.J. Abrams	PG-13	123
11	2013-11-08	Thor: The Dark World	170000000	206362140	Alan Taylor	PG-13	120
12	2013-06-21	World War Z	190000000	202359711	Marc Forster	PG-13	116
13	2013-03-22	The Croods	135000000	187168425	Kirk De MiccoChris Sanders	PG	98
14	2013-06-28	The Heat	43000000	159582188	Paul Feig	R	117
15	2013-08-07	We're the Millers	37000000	150394119	Rawson Marshall Thurber	R	110
16	2013-12-13	American Hustle	40000000	150117807	David O. Russell	R	138
17	2013-05-10	The Great Gatsby	105000000	144840419	Baz Luhrmann	PG-13	143

Training and Reporting sets

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Training
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Reporting
set

Training, Test and Reporting sets

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Test set

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Training
set

Test set

Training and Test sets

Training set

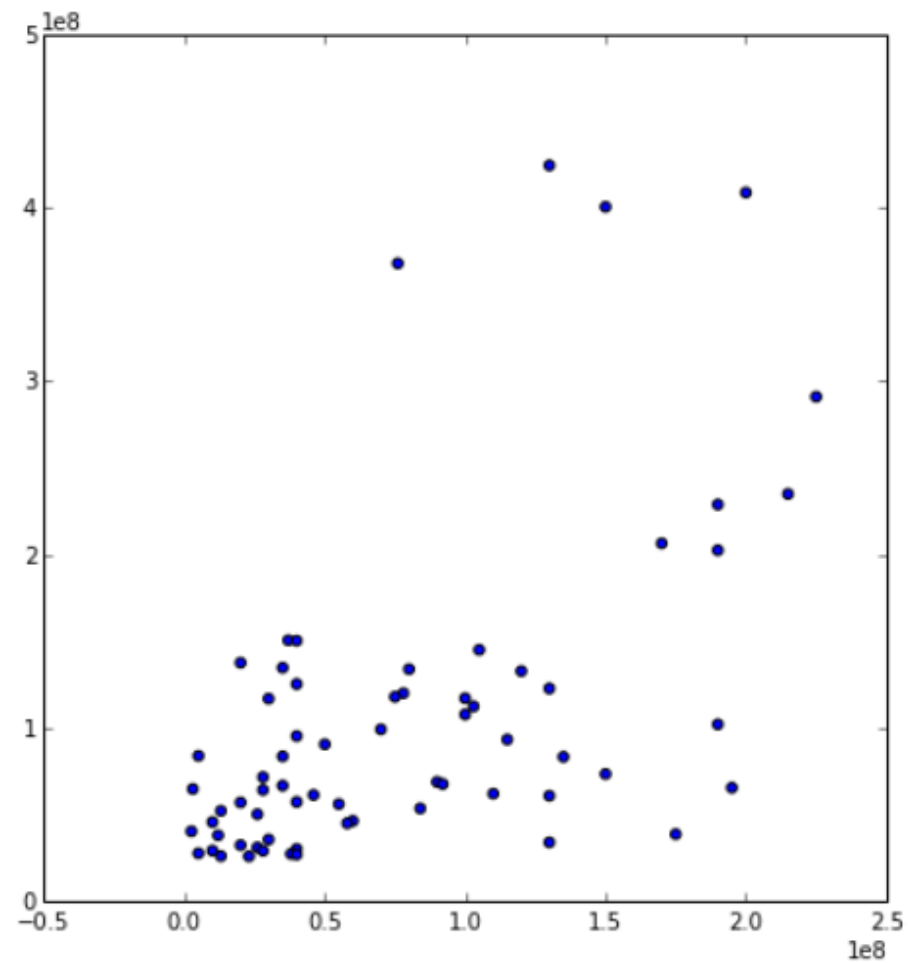
fit the model

Test set

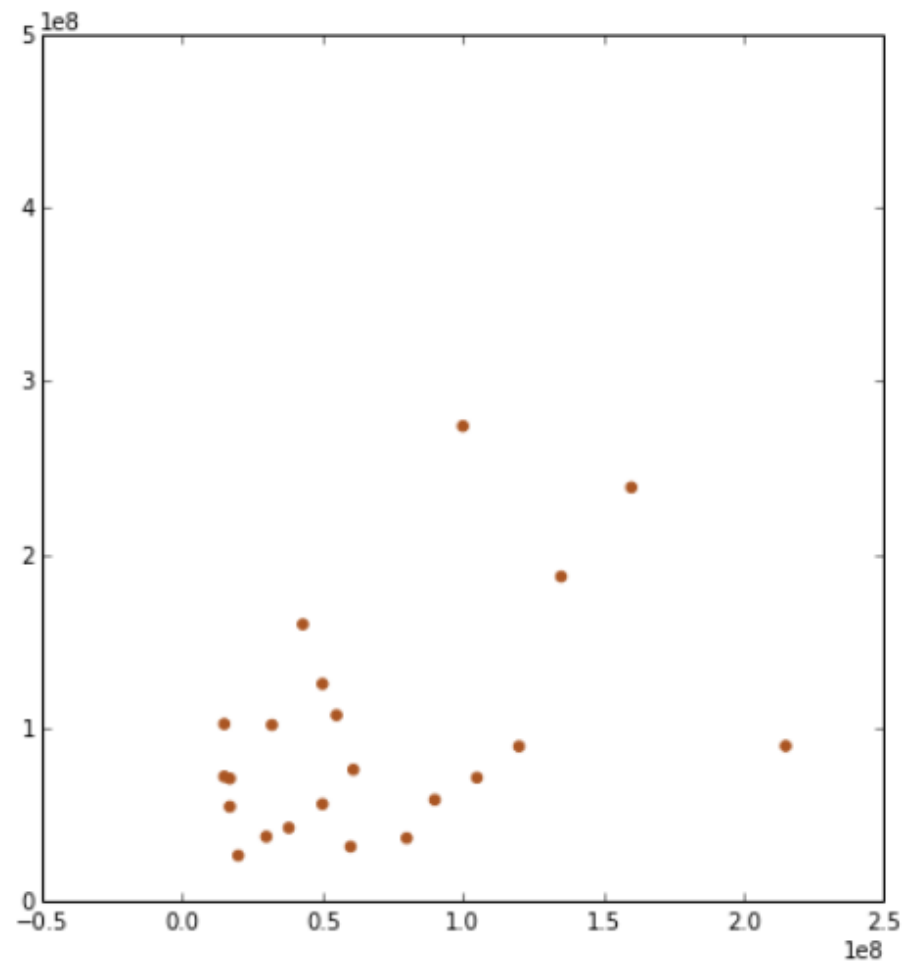
measure performance

- predict y with model
- compare with actual y
- measure error

Training set

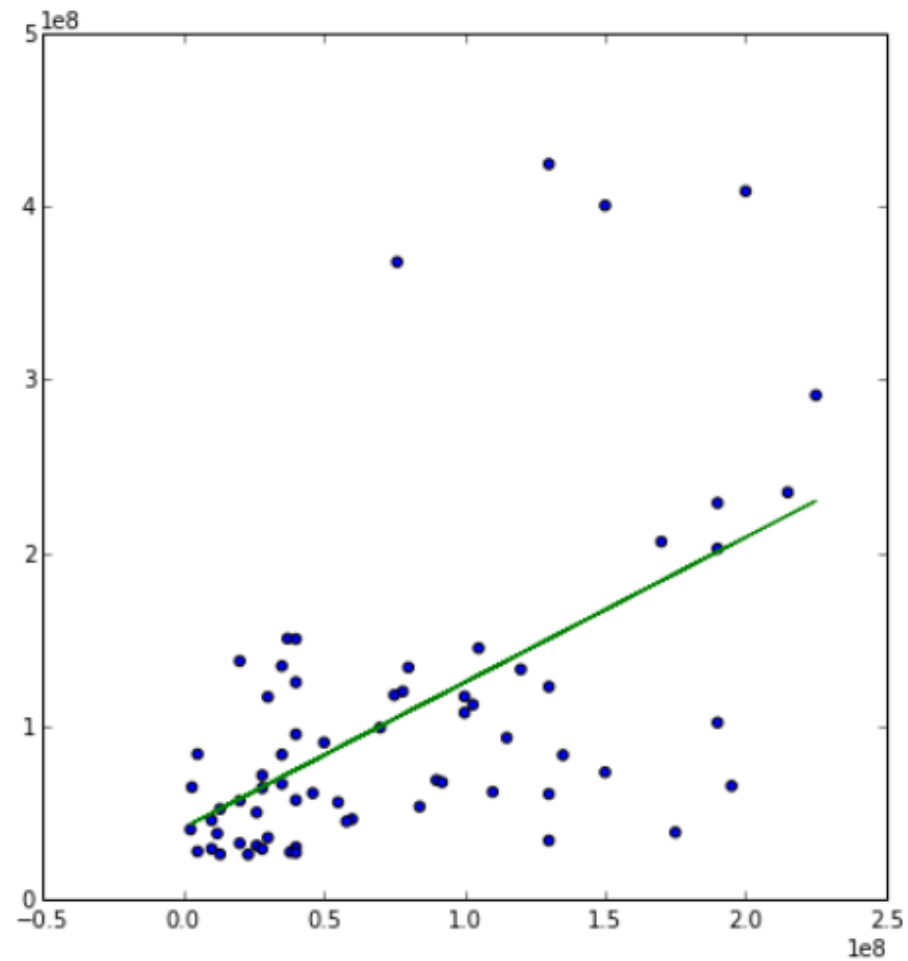


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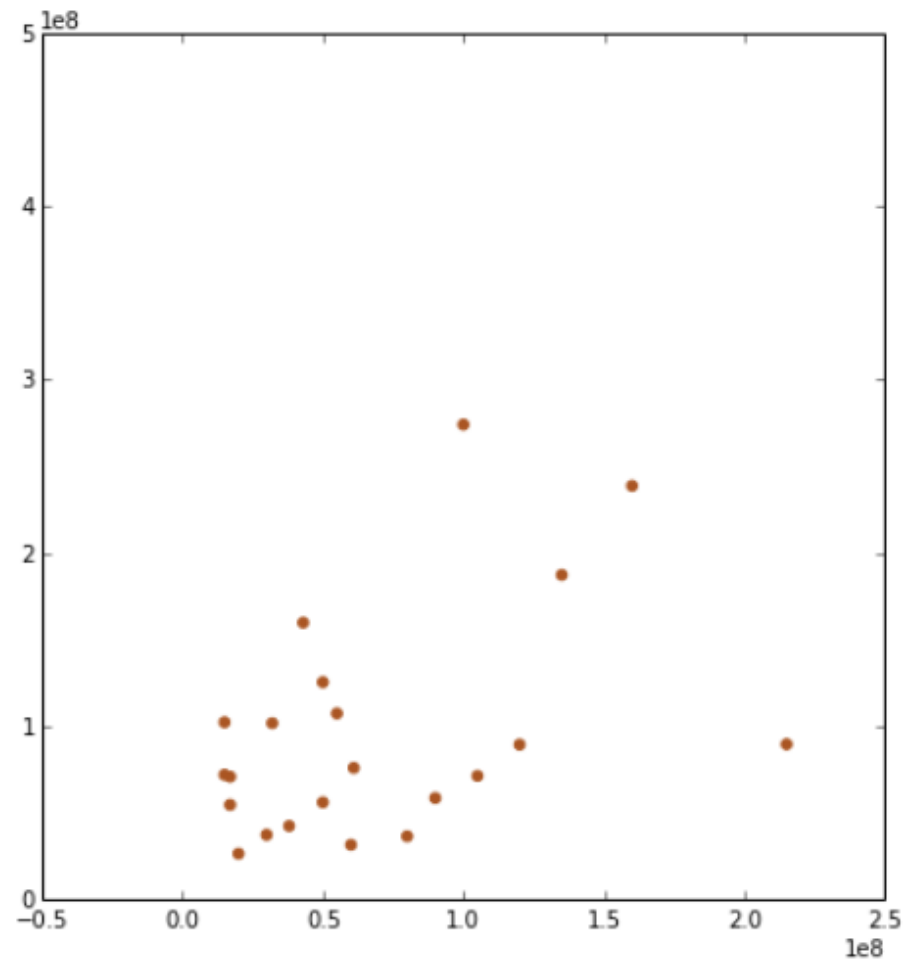


Training set

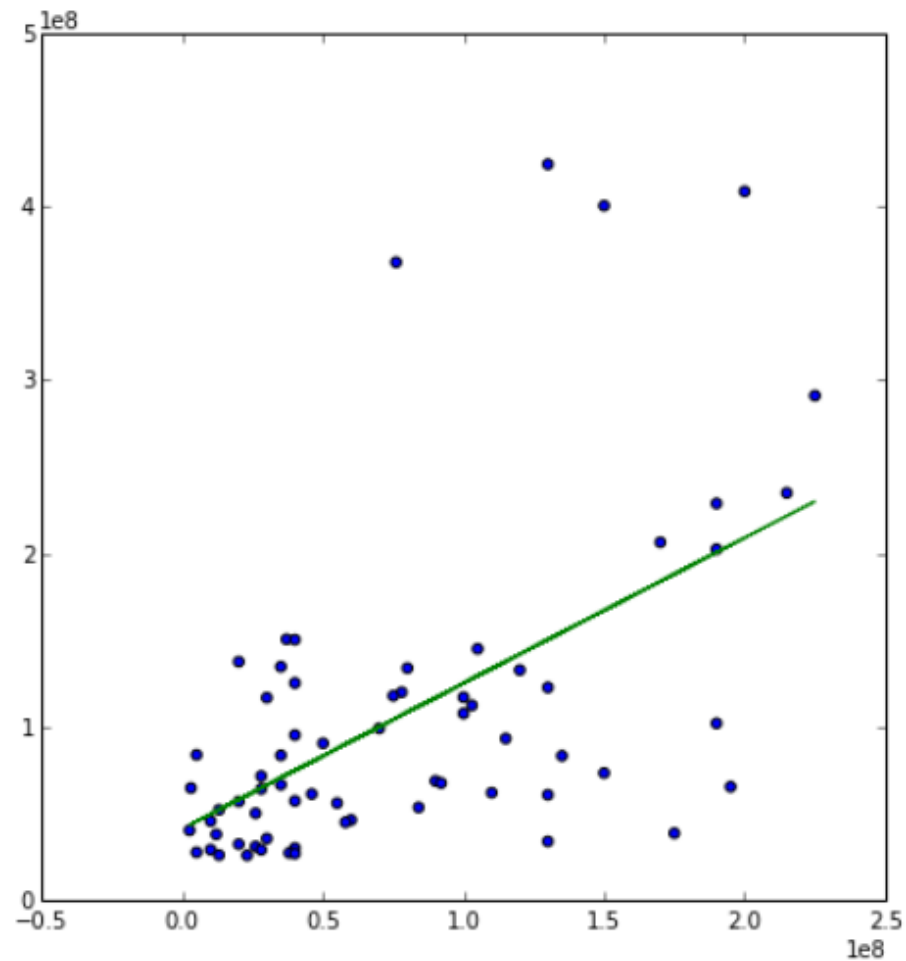
Fit the model



Test set

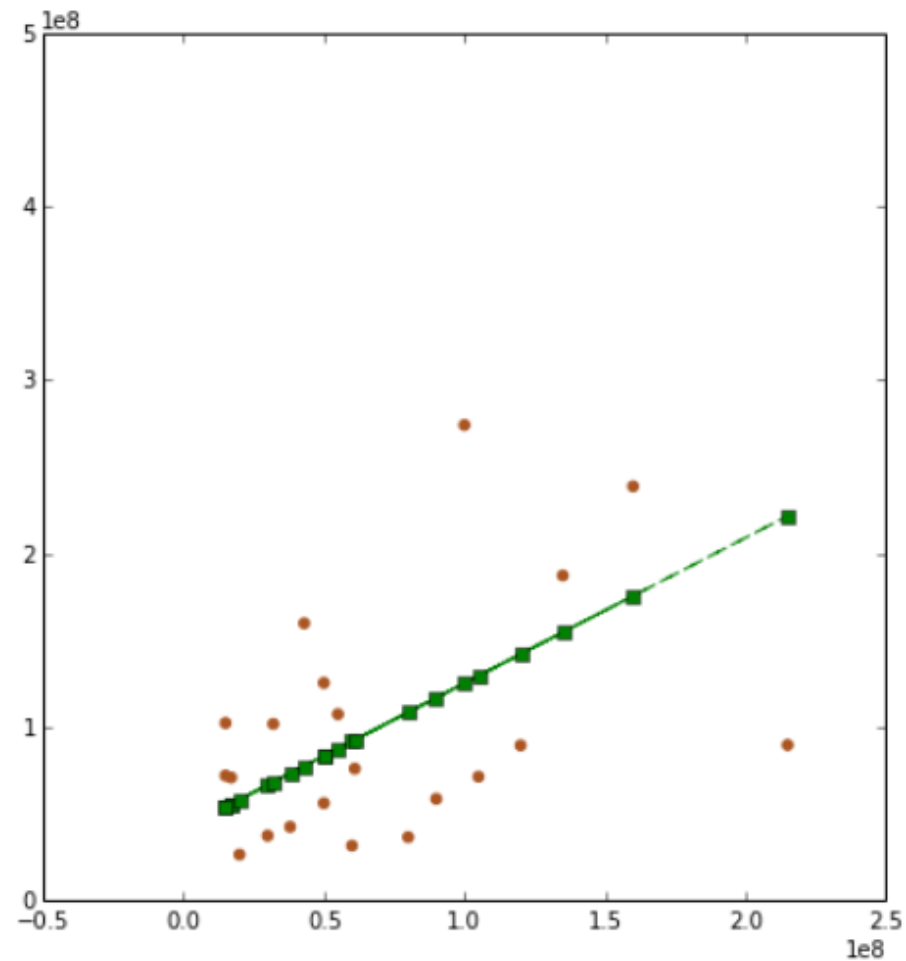


Training set



Test set

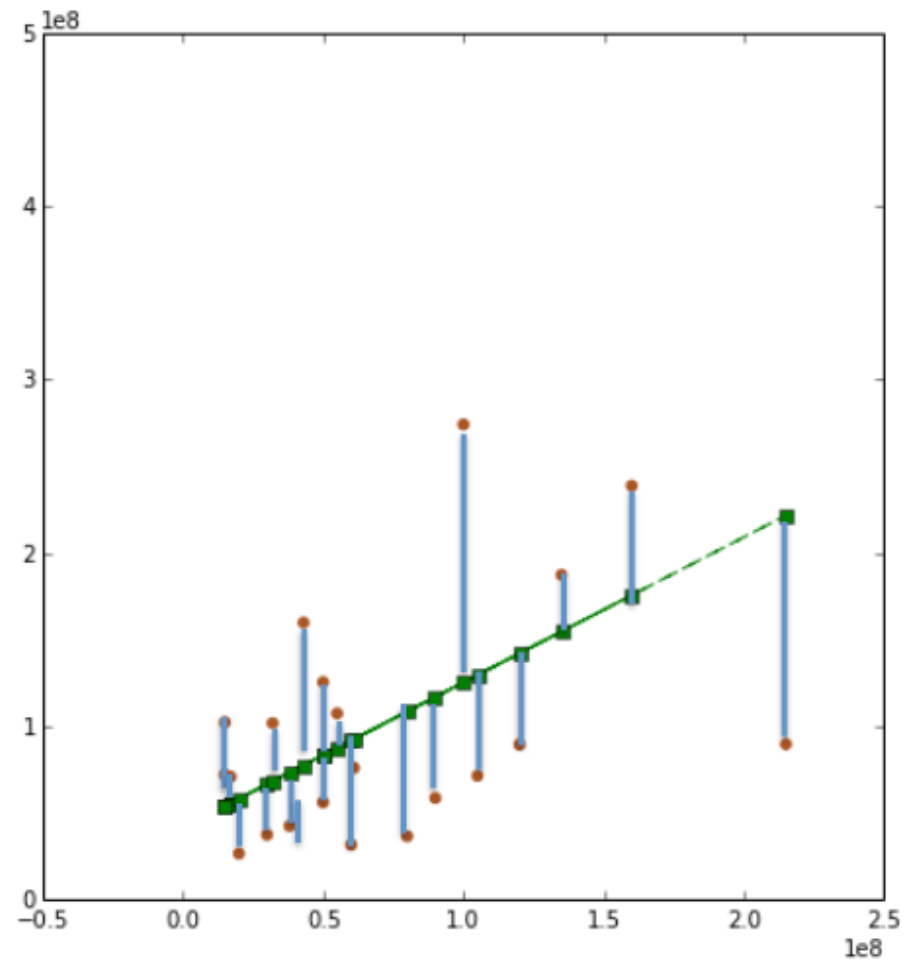
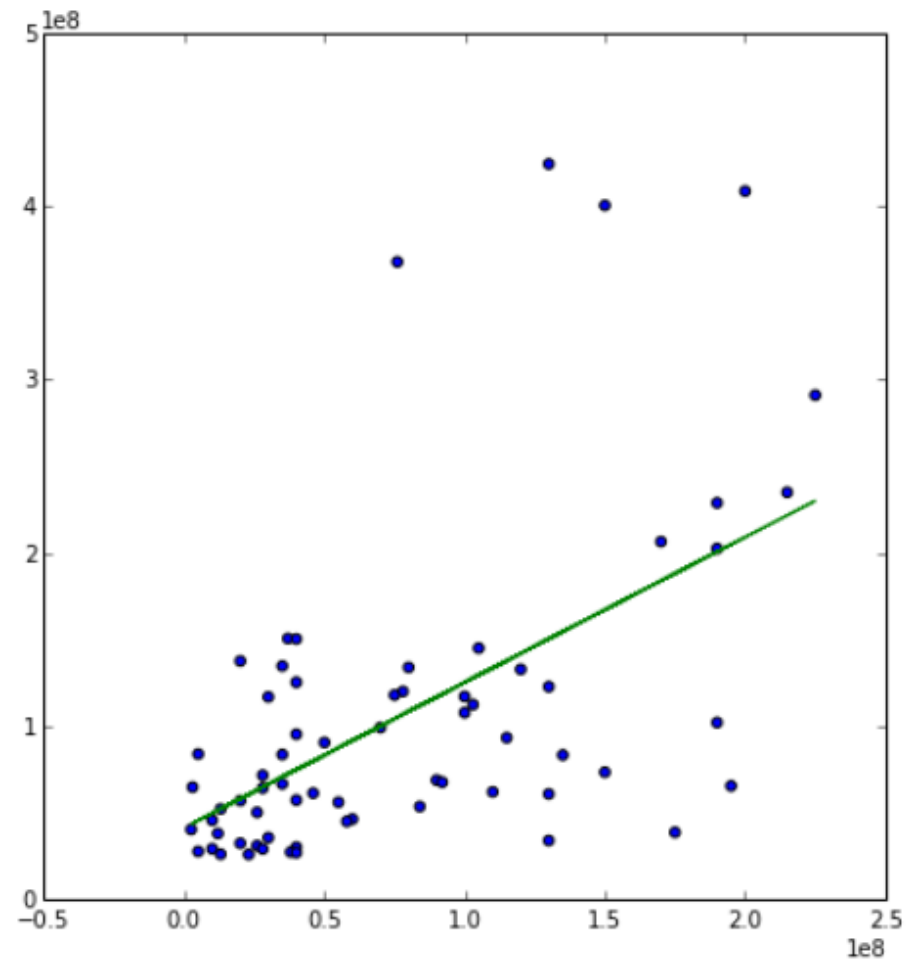
Use the model to
predict y from x



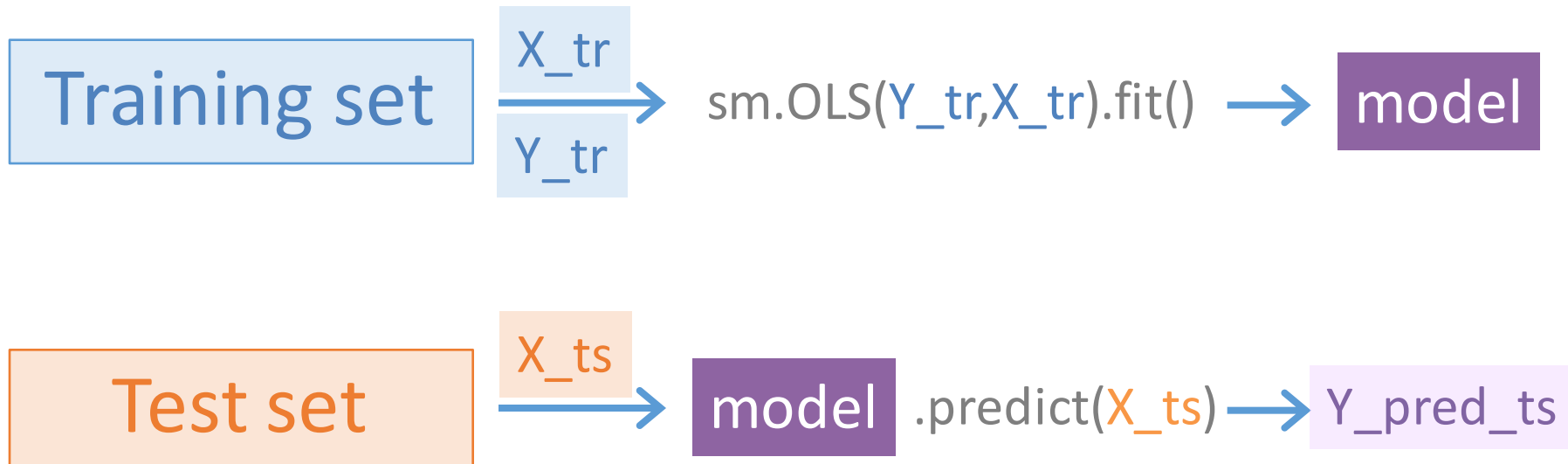
Training set

Test set

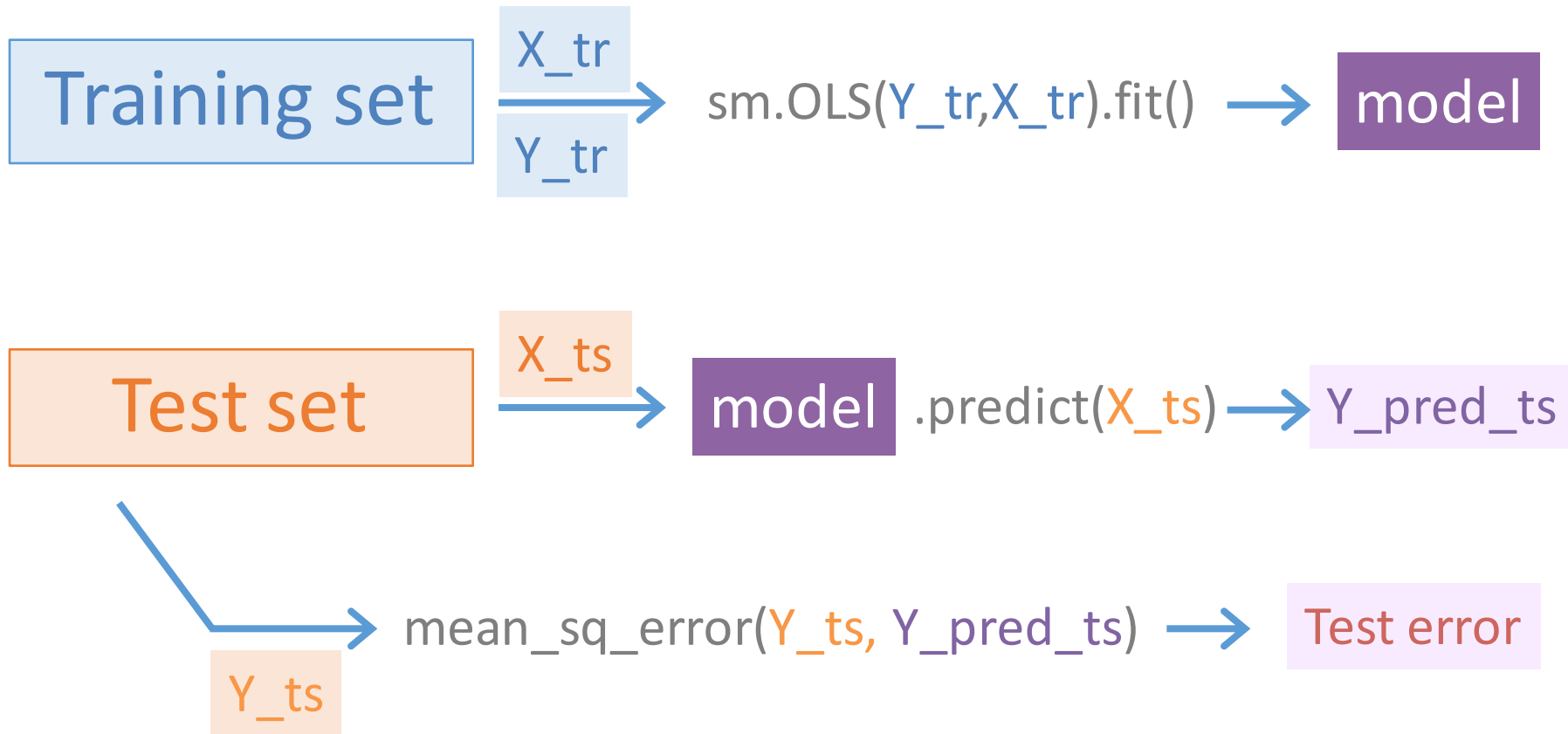
Measure the error



Training and test sets



Training and test sets



Cross validation

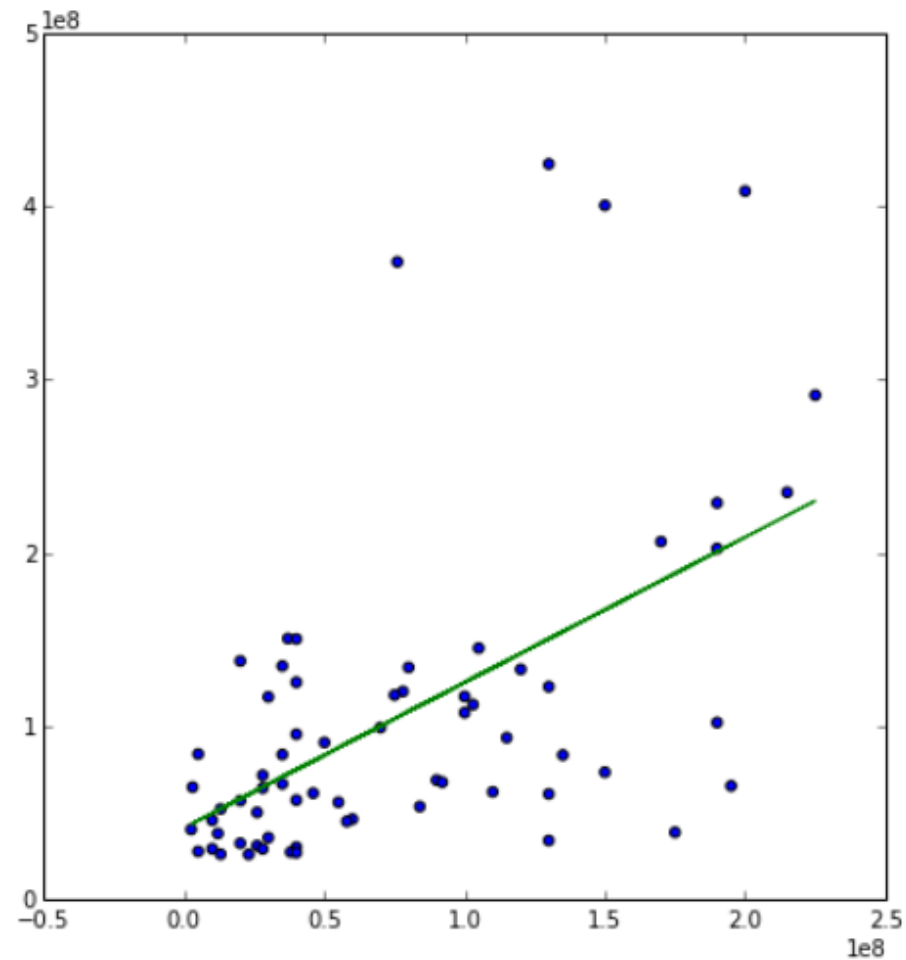
What's better than a single Test set?

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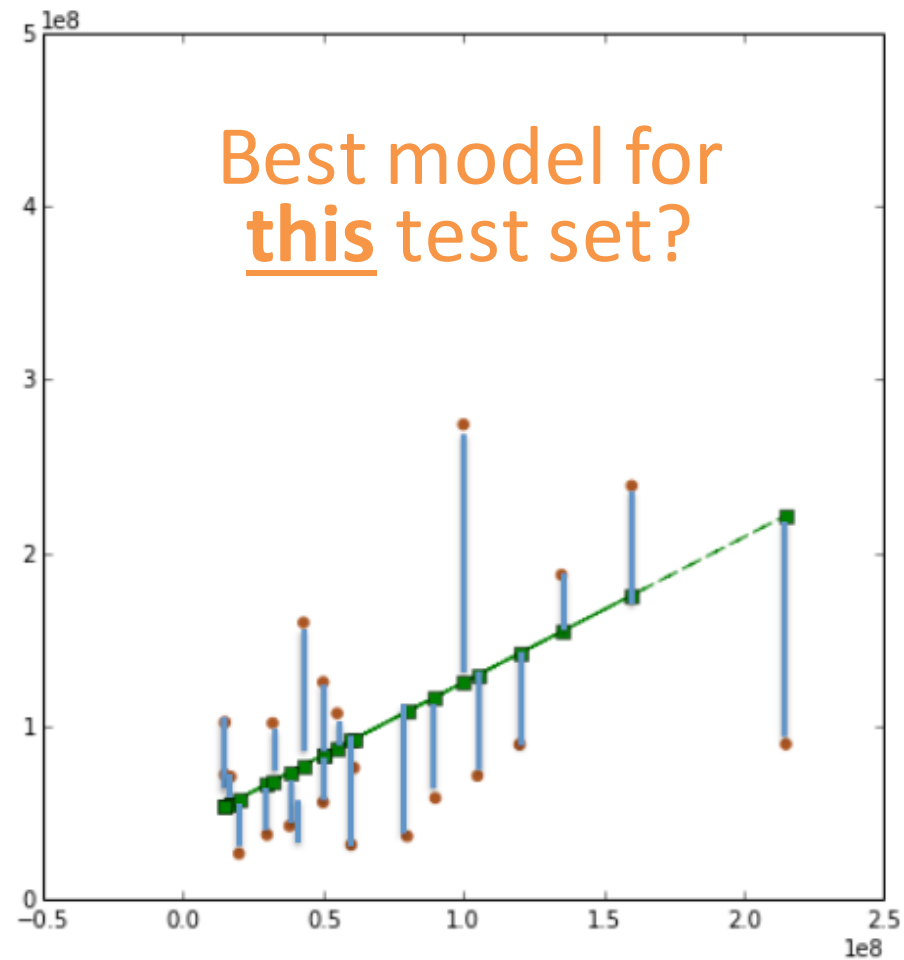
Training
set

Test set

Training set



Test set



Cross validation

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17	2013-05-10	The Great Gatsby	105000000	144840419	Baz Luhrmann	PG-13	143

Training
set

Validation
set

Cross validation

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Training
set 2

Validation
set 2

Cross validation

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Validation
set 3

Training
Set 3

Cross validation

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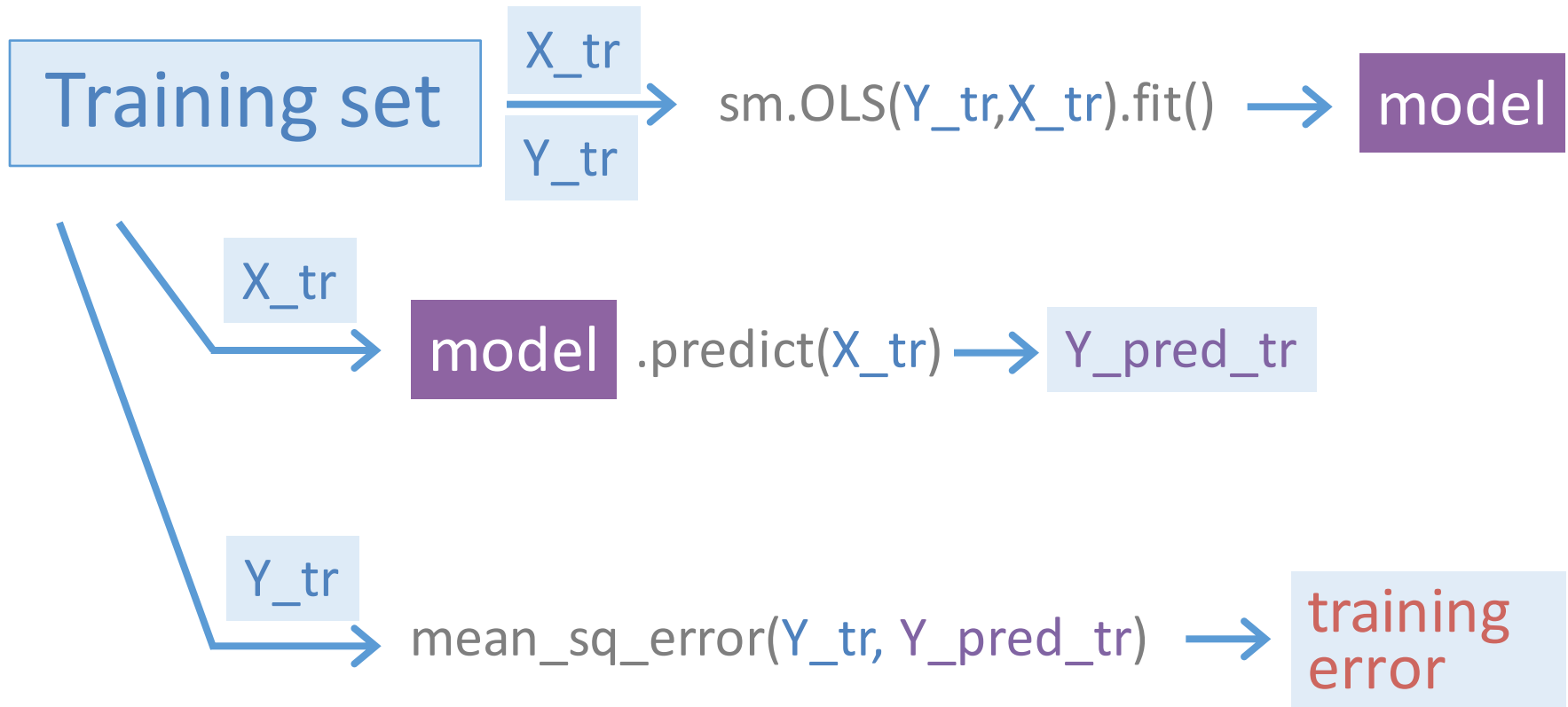
Validation
set 4

Training
Set 4

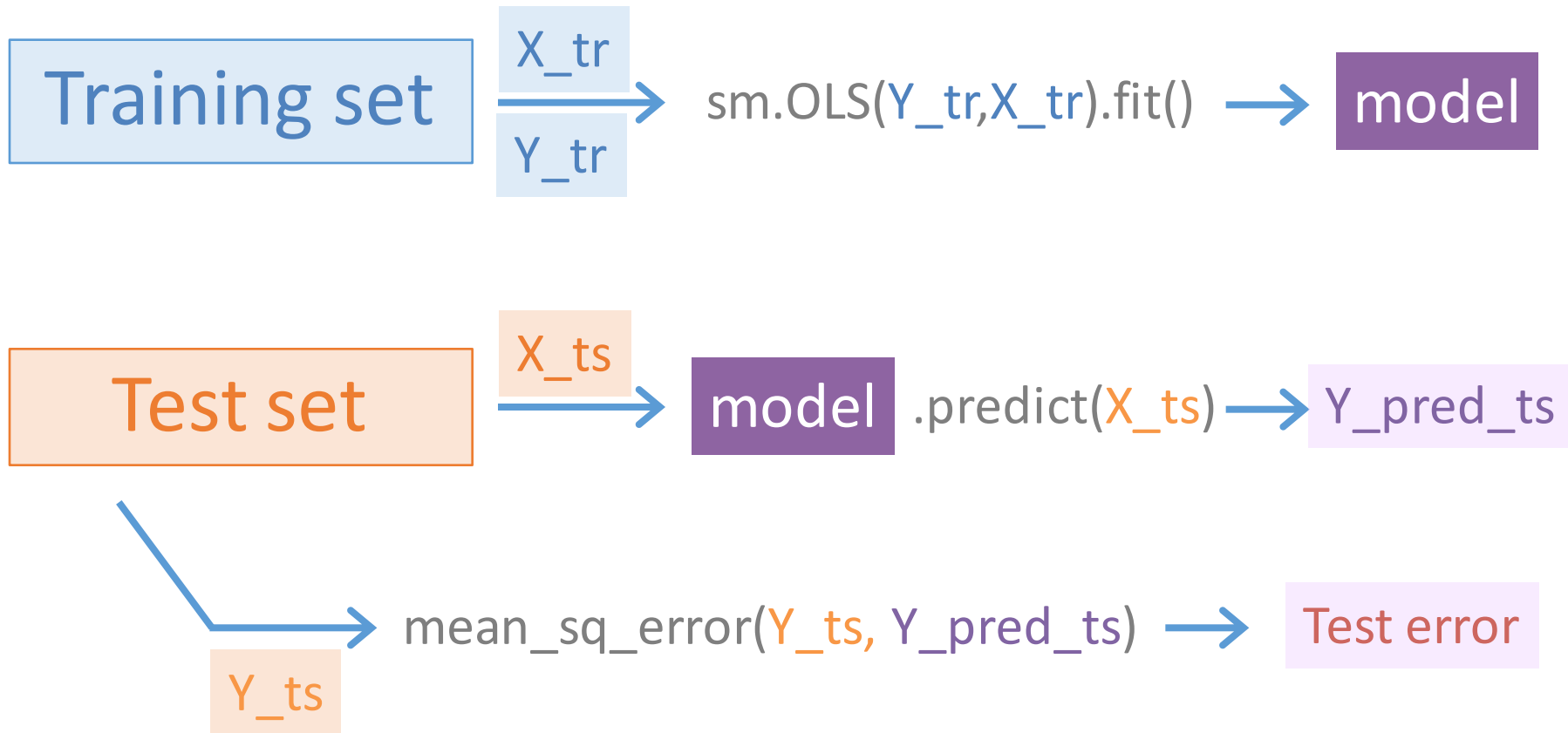
Diagnostic tools with training and test errors



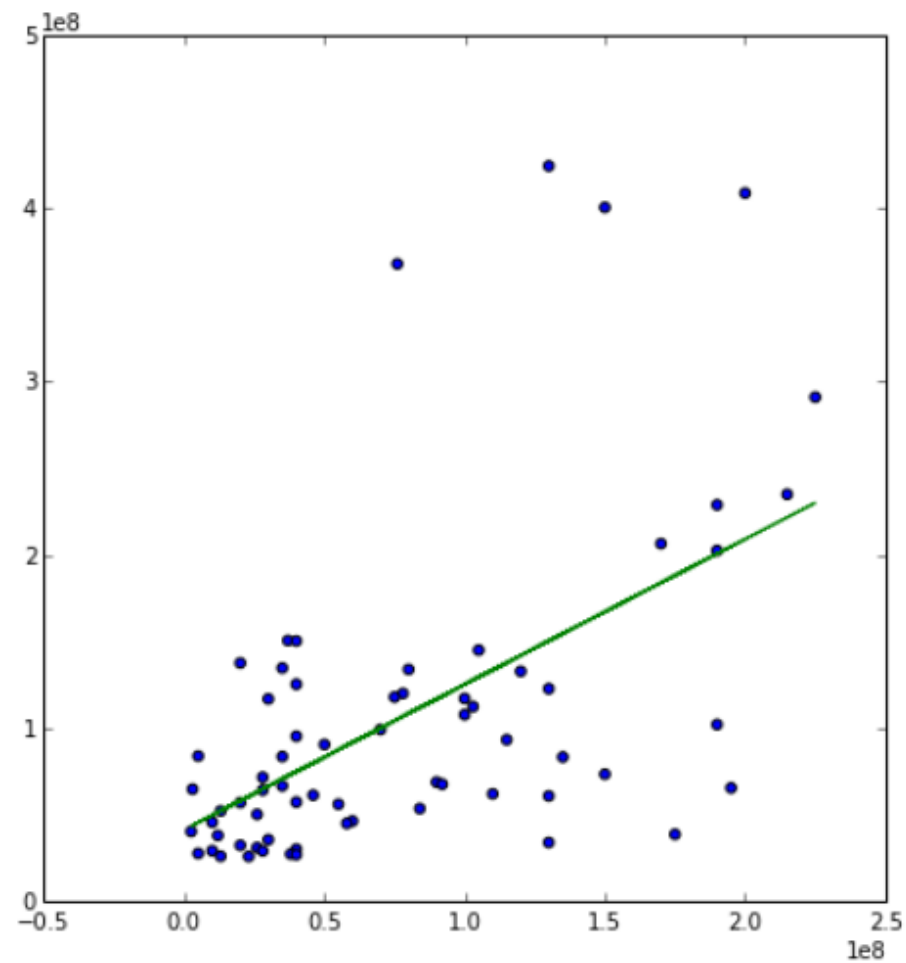
Calculating Training error



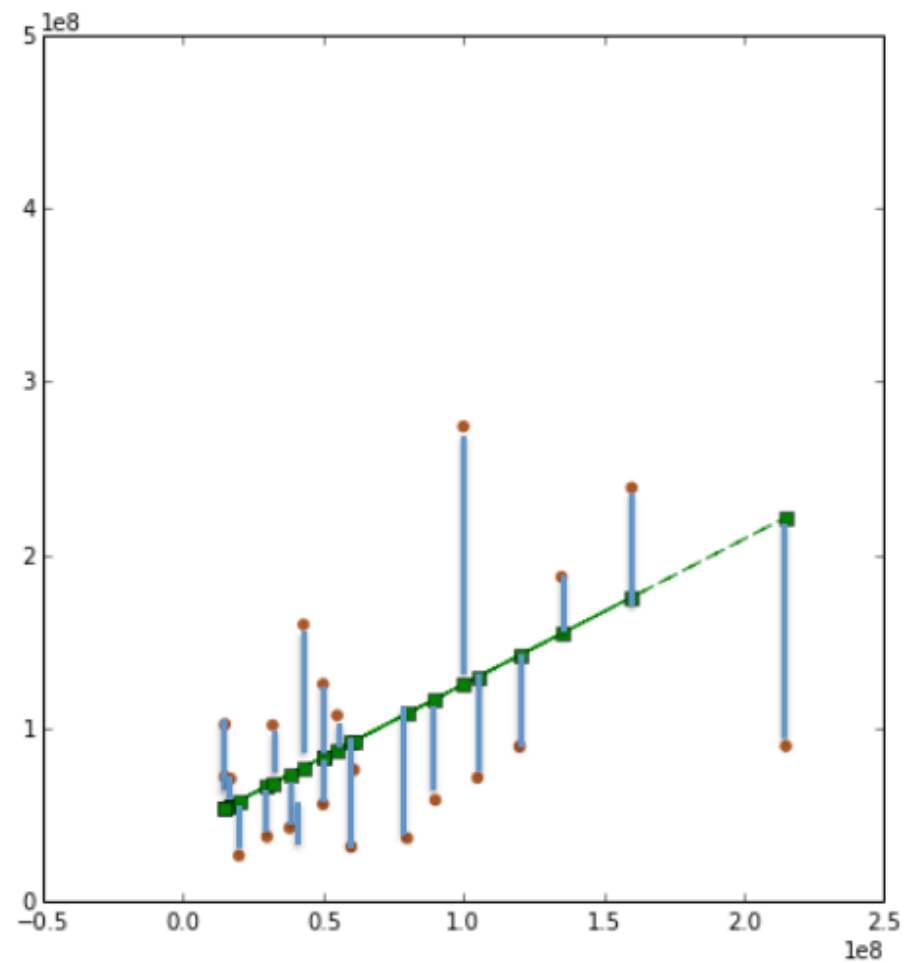
Calculating Test error



Training set

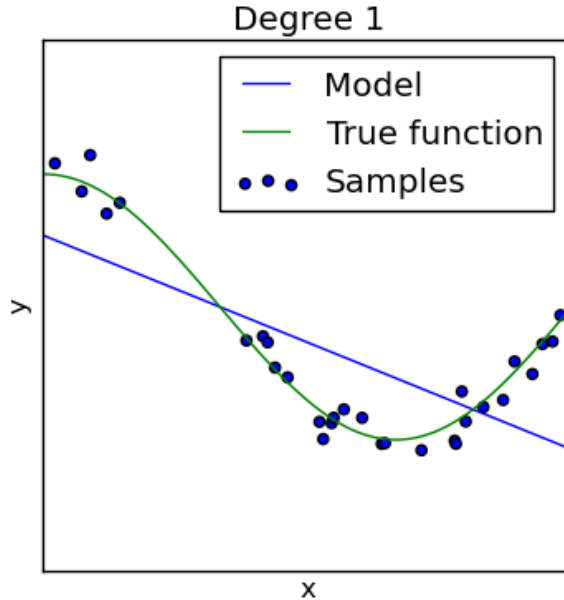


Test set

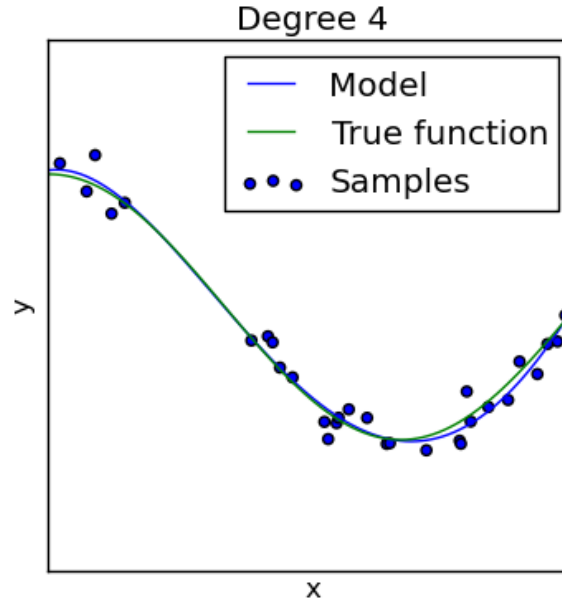


Diagnostic tool to detect under/overfitting

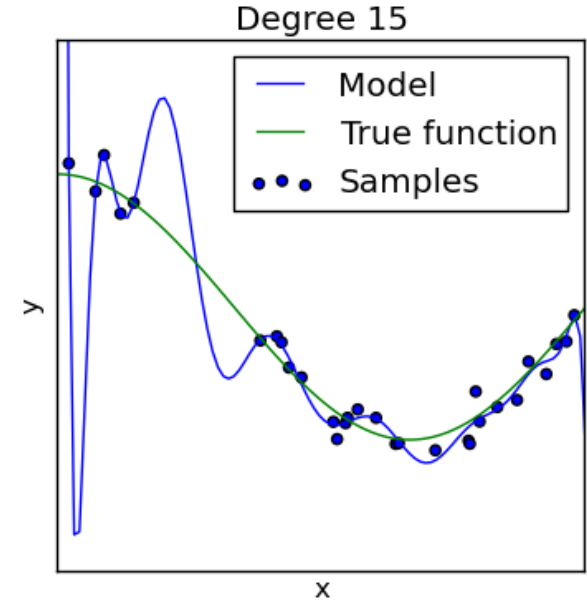
Underfitting



Just Right

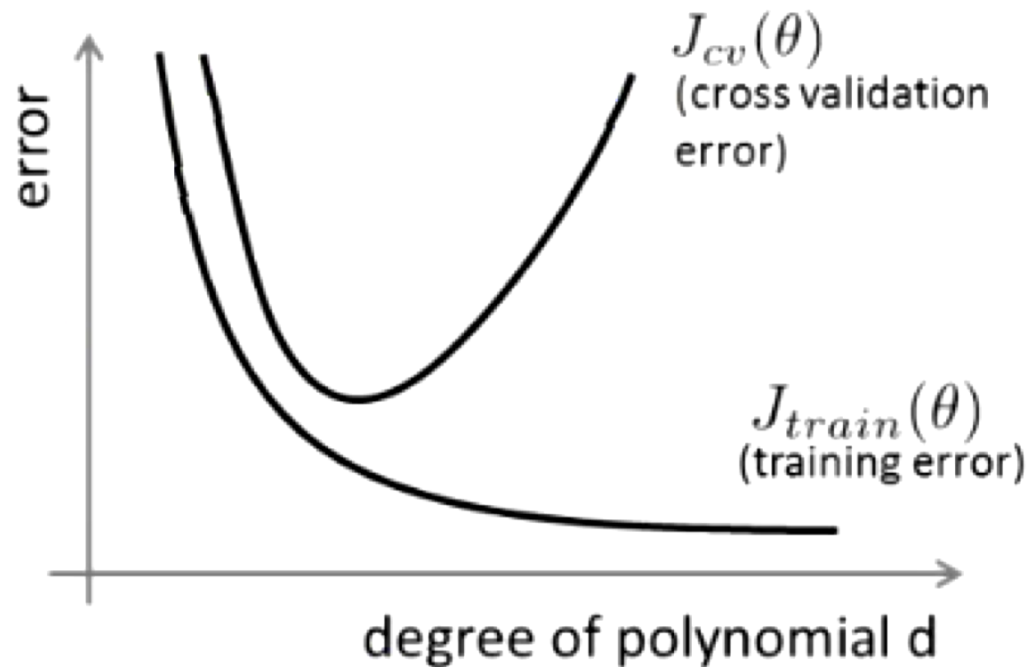


Overfitting



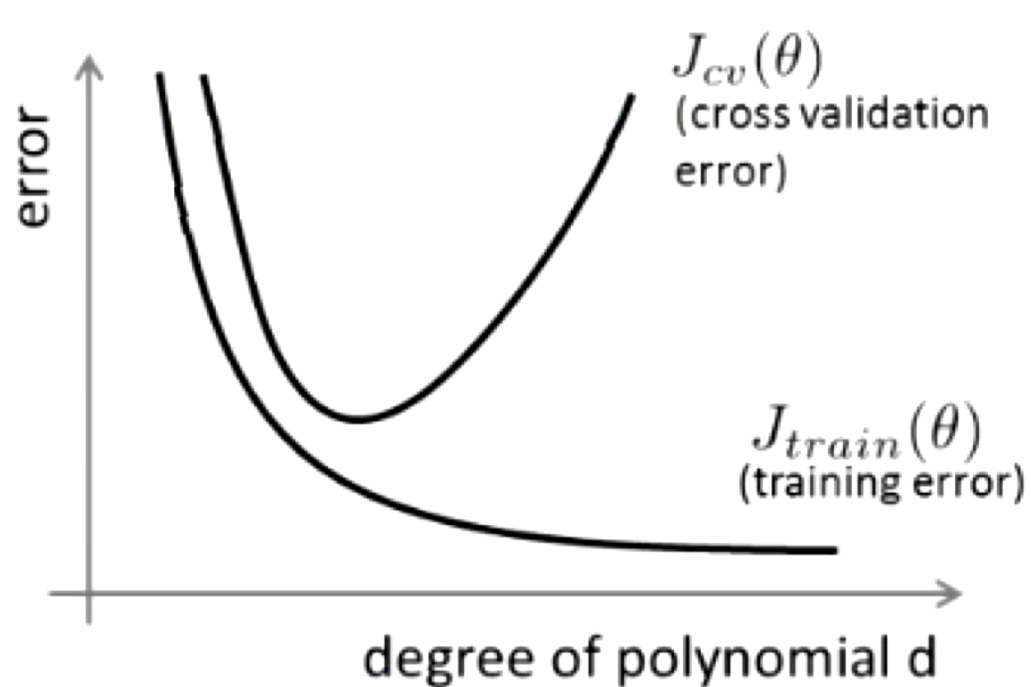
Diagnostic tool I

Errors vs. model complexity



Diagnostic tool I

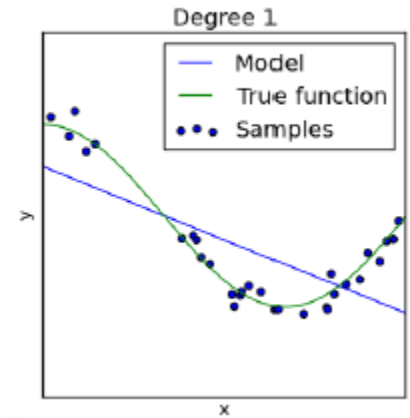
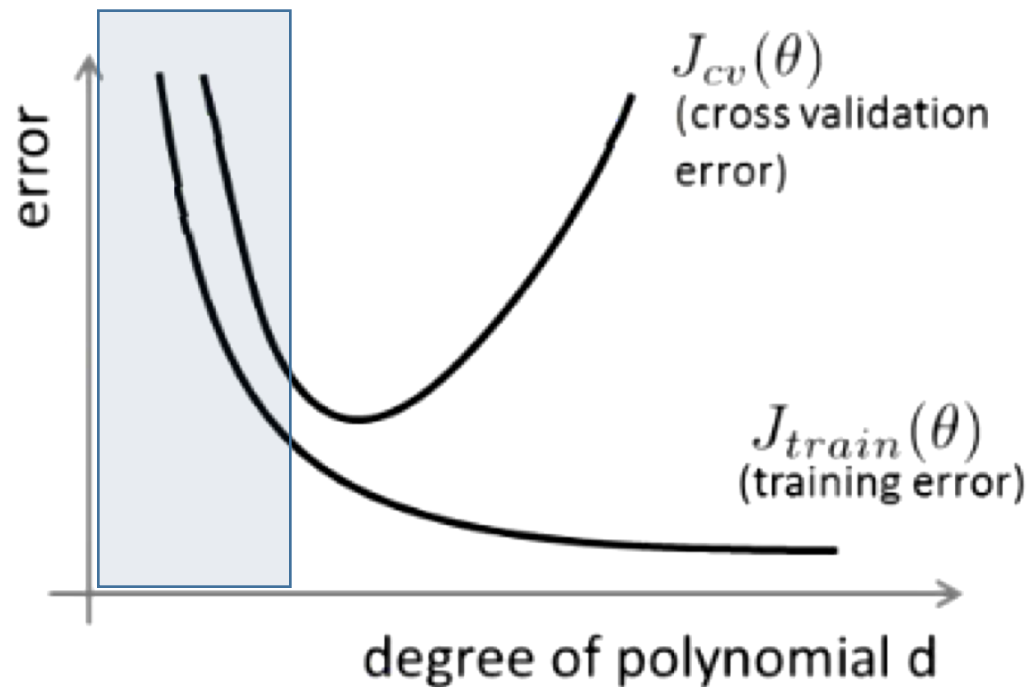
Errors vs. model complexity



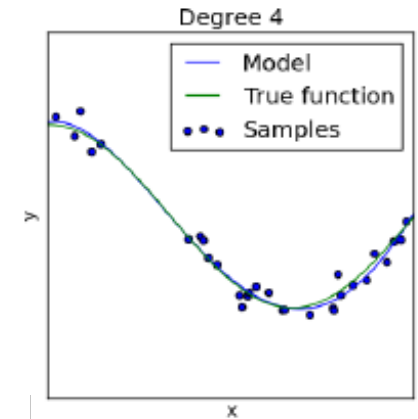
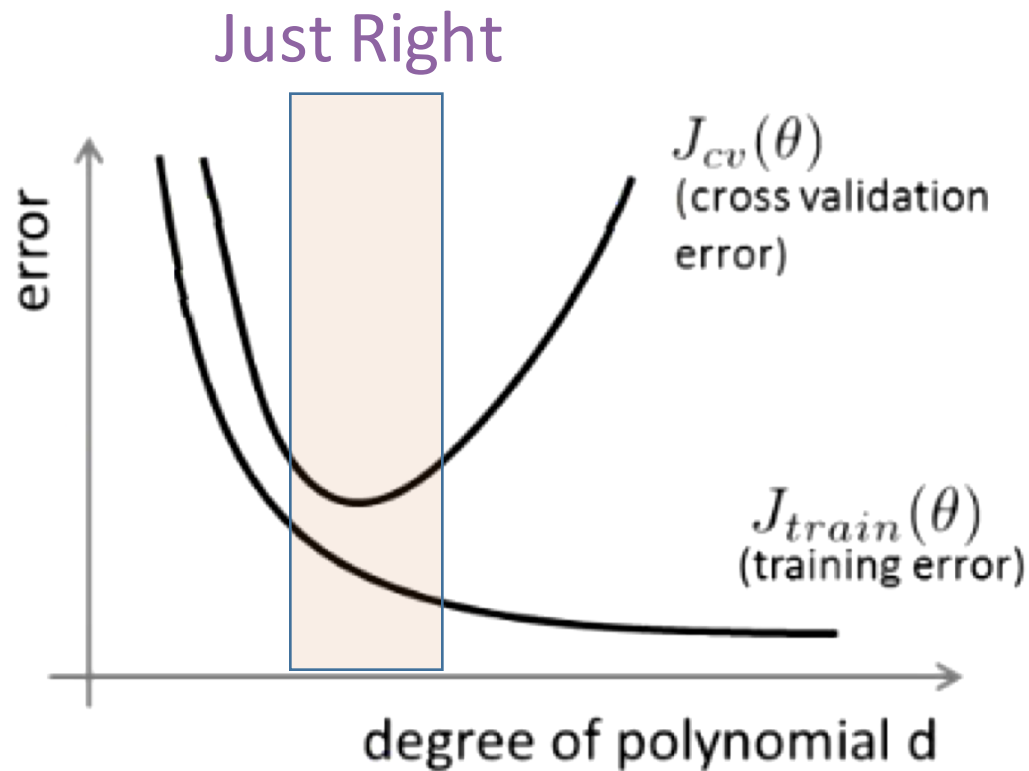
Evaluating MULTIPLE models

Diagnostic tool I

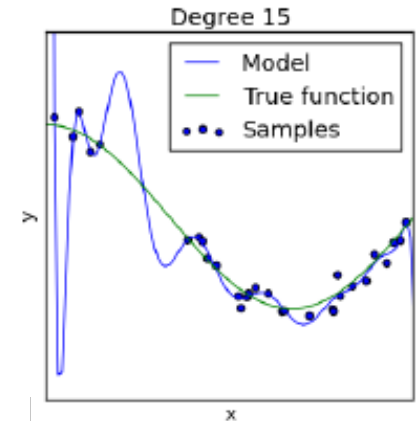
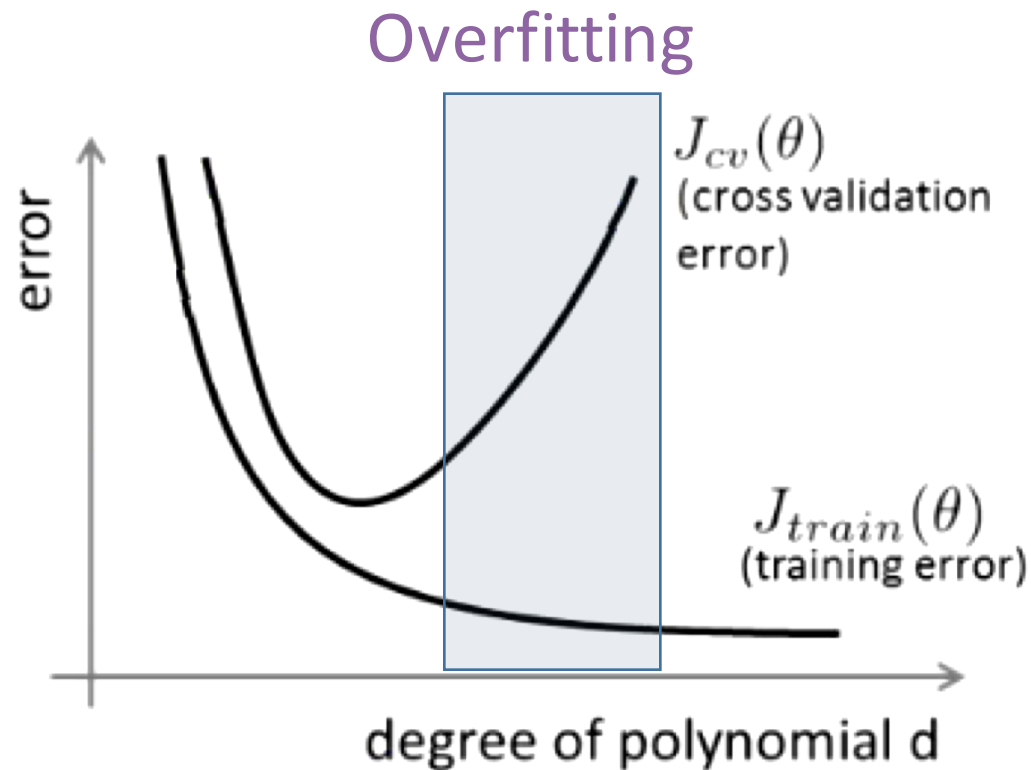
Underfitting



Diagnostic tool I

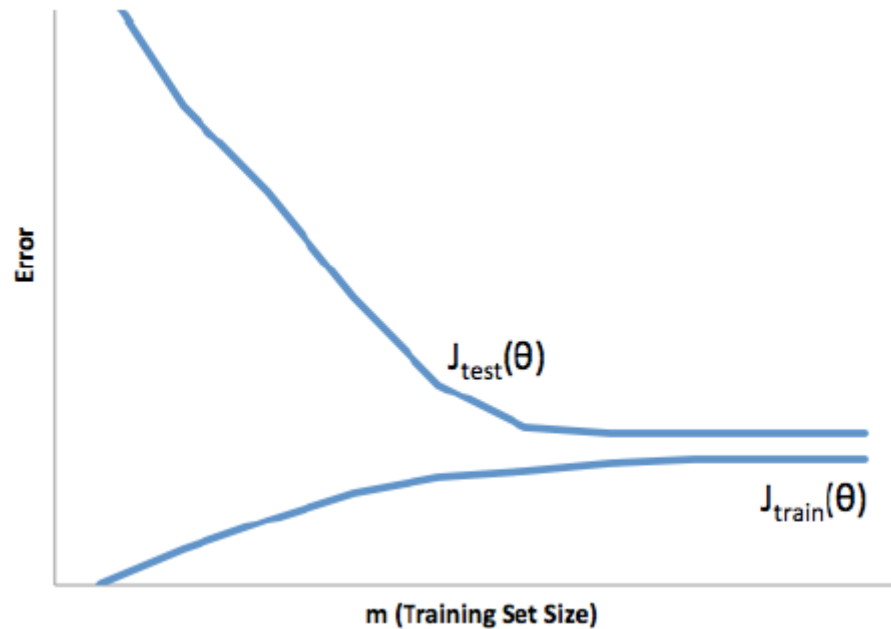


Diagnostic tool I



Diagnostic tool II

Learning curve
Errors vs size of training set

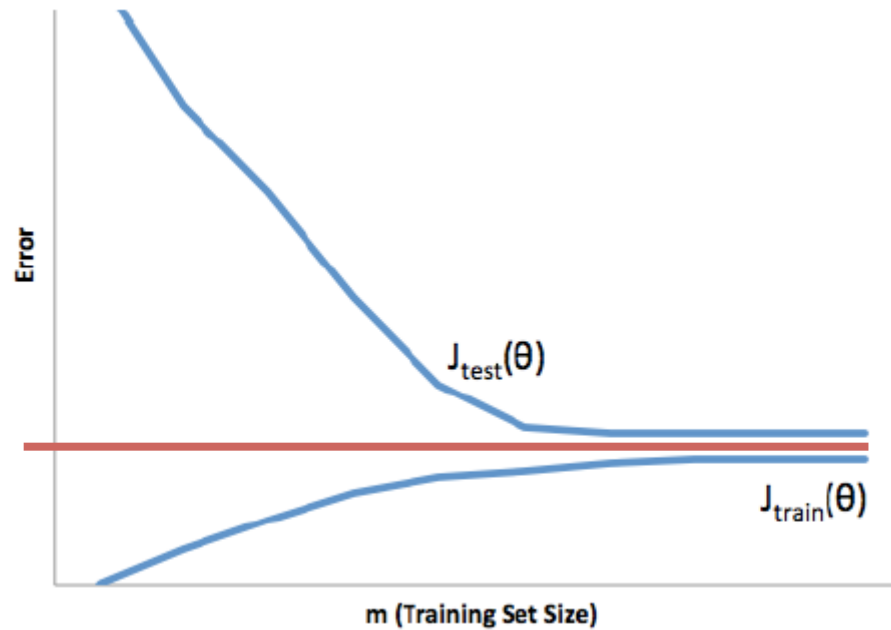


For a SINGLE model form

Diagnostic tool II

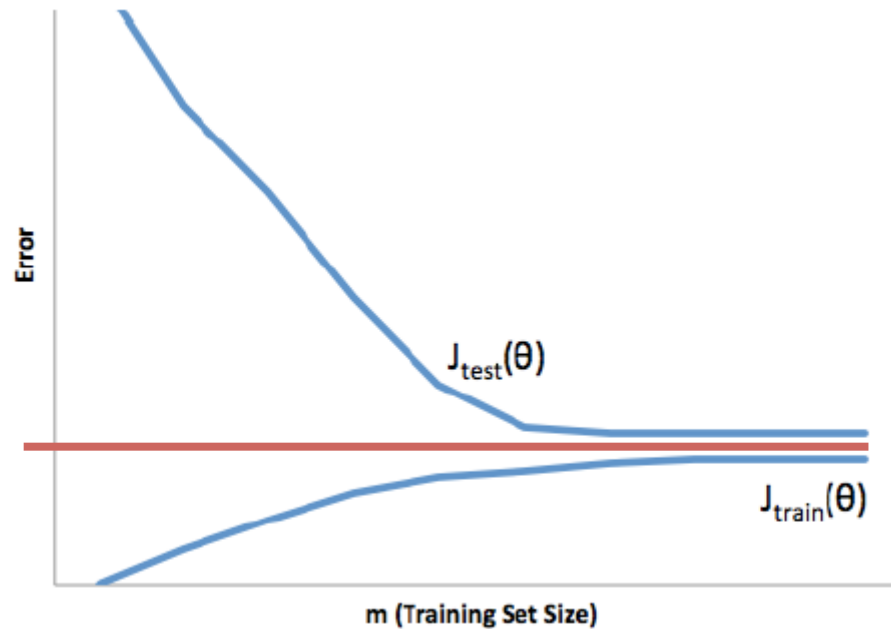
For a SINGLE model form

Is the converged
error high/low?



Diagnostic tool II

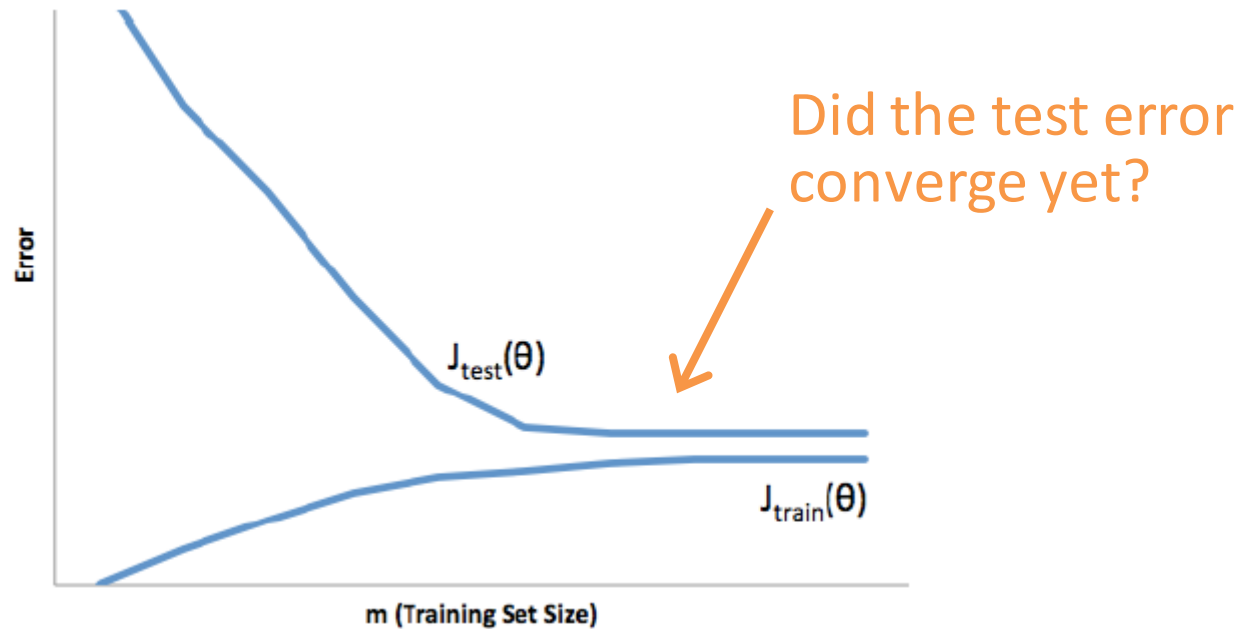
For a SINGLE model form



Is the converged error high/low?
(compared to another model's learning curve)

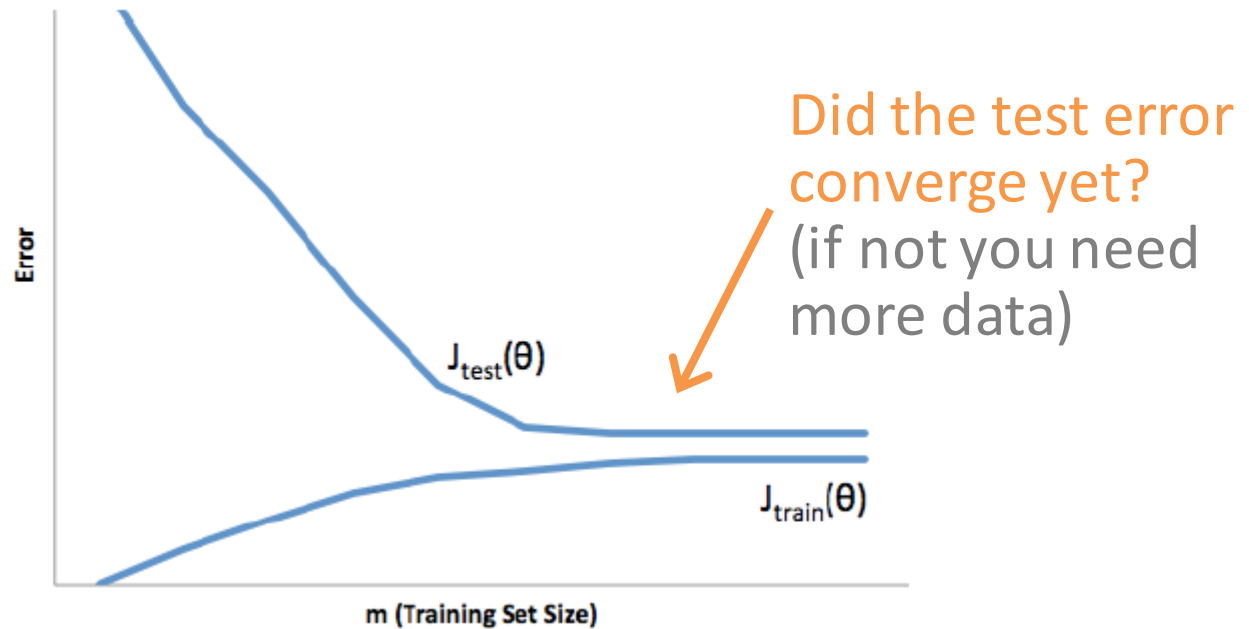
Diagnostic tool II

For a SINGLE model form



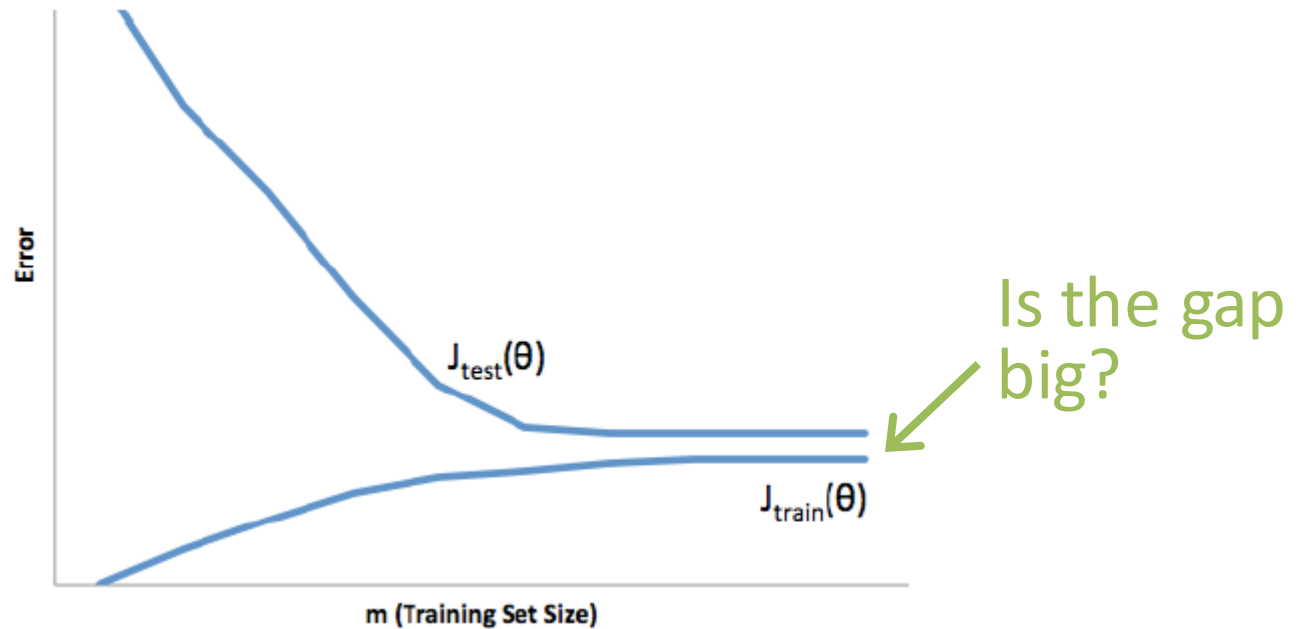
Diagnostic tool II

For a SINGLE model form



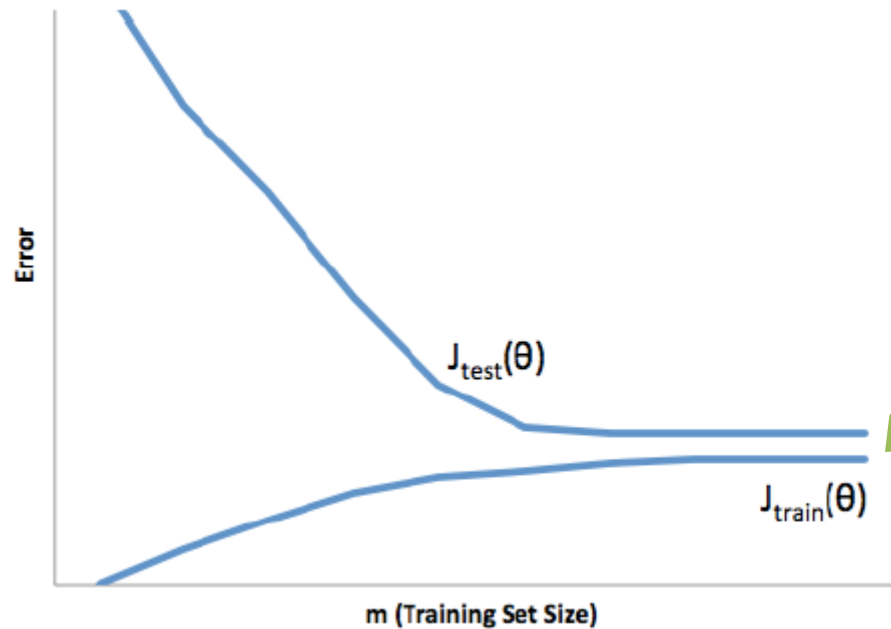
Diagnostic tool II

For a SINGLE model form



Diagnostic tool II

For a SINGLE model form



Is the gap
big?
(big gap
means
overfit)