

# Introduction to ML Basics

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# Machine Learning: All Hype?

## Gartner Hype Cycle for Emerging Technologies, 2016



[gartner.com/SmarterWithGartner](http://gartner.com/SmarterWithGartner)

# Is This Hype?

Everything is a Recommendation



NETFLIX

Over 75% of what people watch comes from our recommendations

Recommendations are driven by **Machine Learning**

# Is This Hype?

| Search: <input type="text"/>                                |                         |                    | Status:  Any Status ▾ |
|---|-------------------------|--------------------|-----------------------|
| Subject   | Sender                  | Date ▲             |                       |
| check this out man...                                       | Nelda Romano            | Thursday 14:59:37  |                       |
| Help me!  | Oswaldo MANNING         | Thursday 12:47:59  |                       |
| Have Arthritis pains? There is help for you.                | Orsa                    | Thursday 03:45:36  |                       |
| down on her, and  | Reginald Stubbs         | Wednesday 06:02:05 |                       |
| natural enlargement   | diane george            | Tuesday 16:37:15   |                       |
| No Subject  | fabian dickhaut         | Monday 10:38:59    |                       |
| only Youngest have Shocking sexuality other                 | Kristie Sapp            | Monday 01:07:32    |                       |
| Reduces stress  | frankie kim             | 06.02.2005 16:27   |                       |
| PERSONAL  | esnol2005               | 06.02.2005 04:56   |                       |
| We need to render the delight of having the finest          | Clotilda Gadnunqt       | 06.02.2005 02:10   |                       |
| Find more savings online                                    | kennith draper          | 05.02.2005 22:30   |                       |
| faster cheaper meds   | Lidia White             | 05.02.2005 16:37   |                       |
| Breaking News   | Dee H. Edwardsd         | 05.02.2005 14:40   |                       |
| We have your wanted meds at low prices only.                | lucien hyatt            | 04.02.2005 06:59   |                       |
| 100% zum einladen__1679438                                  | Isel Rios               | 03.02.2005 03:34   |                       |
| Enjoy your wanted meds.                                     | tracey uliano           | 03.02.2005 02:28   |                       |
| Confirm Your Washington Mutual Online Banking               | Washington Mutual On... | 02.02.2005 22:03   |                       |
| out P1NNACCLE SYSTEM, MACR00MEDIA, SYMANTEEC, PC GAMES, ... | Valerie Ileen           | 02.02.2005 19:11   |                       |
| Finished  | Cecilia Fuller          | 02.02.2005 05:57   |                       |
| You can save more thru ordering meds on our site.           | mel sevic               | 02.02.2005 01:21   |                       |
| The most insane action                                      | Katrina Souza           | 31.01.2005 08:19   |                       |
| You don't have to be fat Noel                               | Kristin                 | 28.01.2005 03:22   |                       |

# Is This Hype?



# Hype or Not: Machine Learning Isn't Going Anywhere

- Many regression and classification problems have been using “machine learning” techniques for more than a decade.
- Learning about basic machine learning can make simple statistical problems easier.
- Being able to debug and introspect ML models is a useful task whether you are developing models or not.
- Systems are only getting more complex, so learning the basics now is a great idea.

# ML Basics

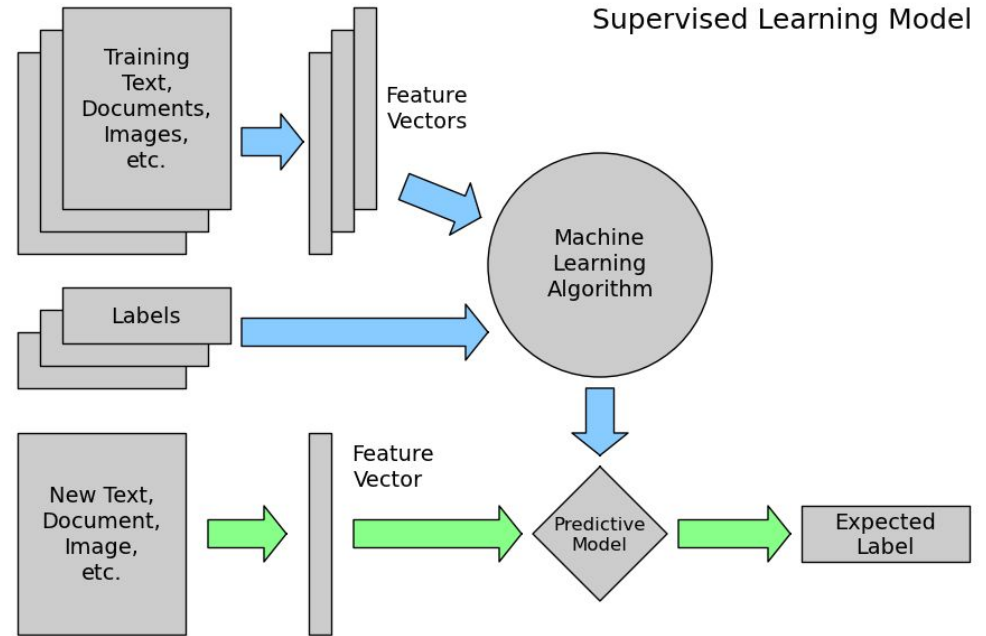
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# Types of Machine Learning

Supervised: With Labels

Unsupervised: Without Labels

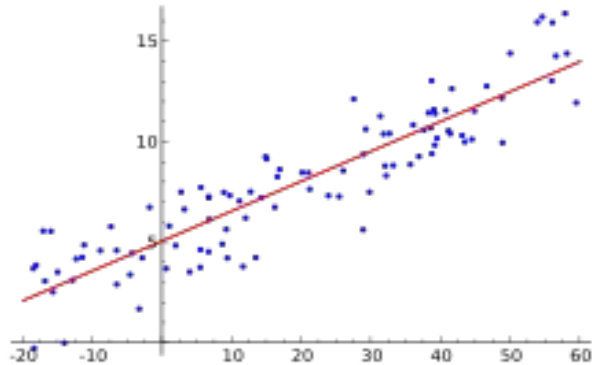
Semi-Supervised: With Some Labels





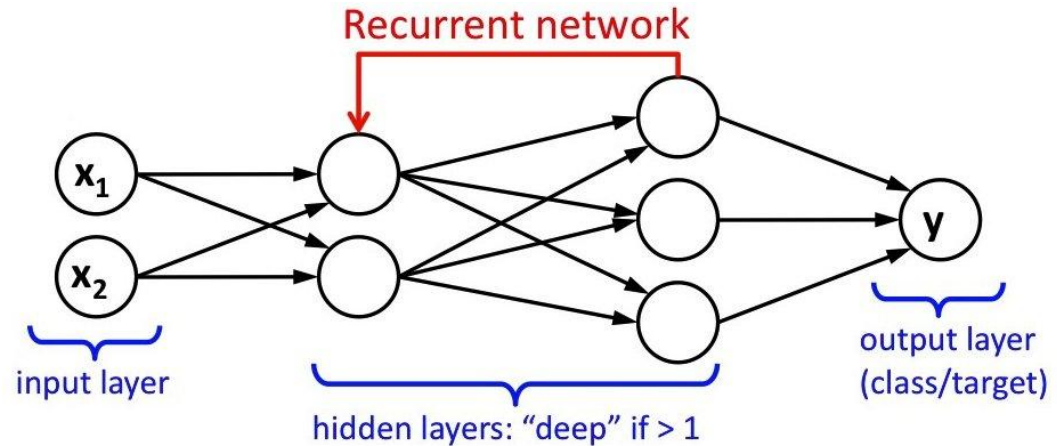
# Types of Machine Learning

Simple / Basic / Shallow



vs.

Deep



And... Reinforcement Learning, Adversarial Learning, Generative Networks

# Pop Quiz

What type of machine learning might I use for determining if the image has a cat in it?



# “Simple” Machine Learning Models

Regression

Classification

Clustering

Random Forests

Collaborative Filtering / Recommendations

Probability-Based

Ensemble

# Pop Quiz

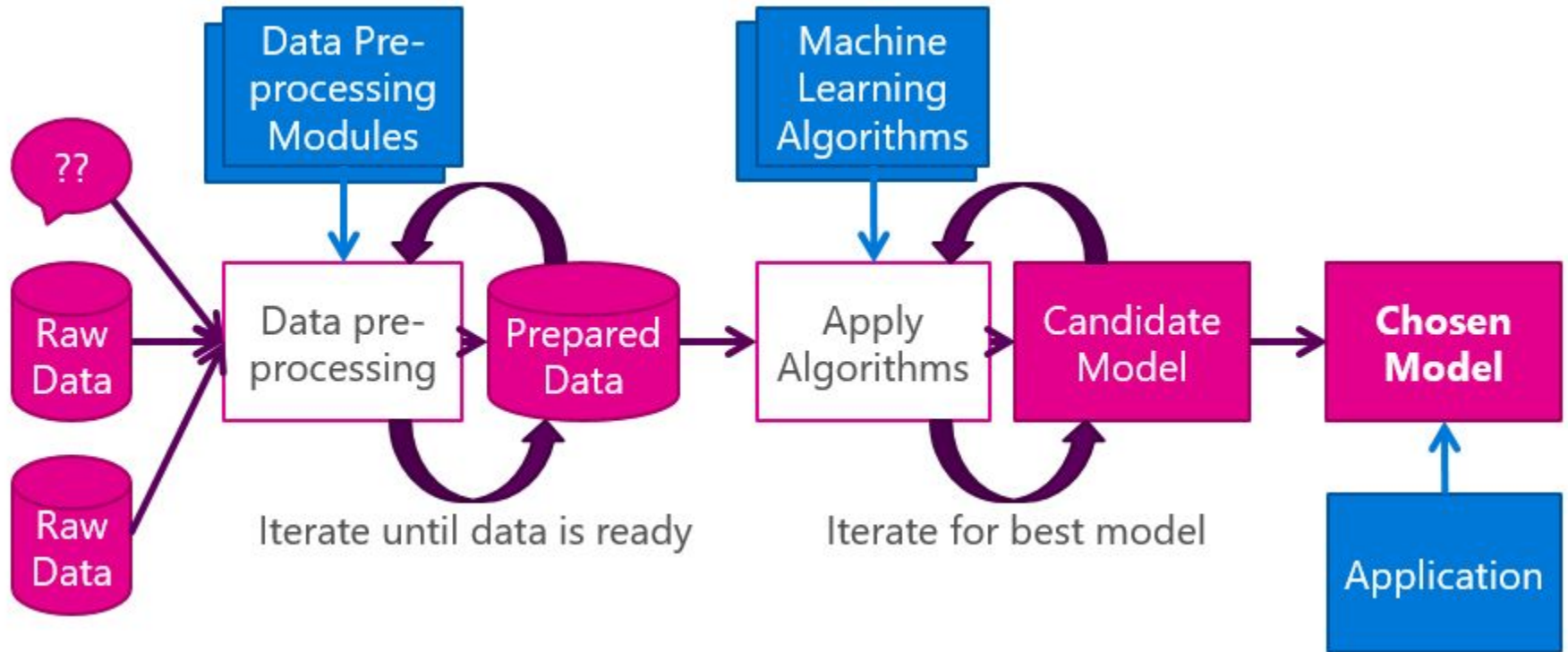
What type of model might I use to auction advertisements?



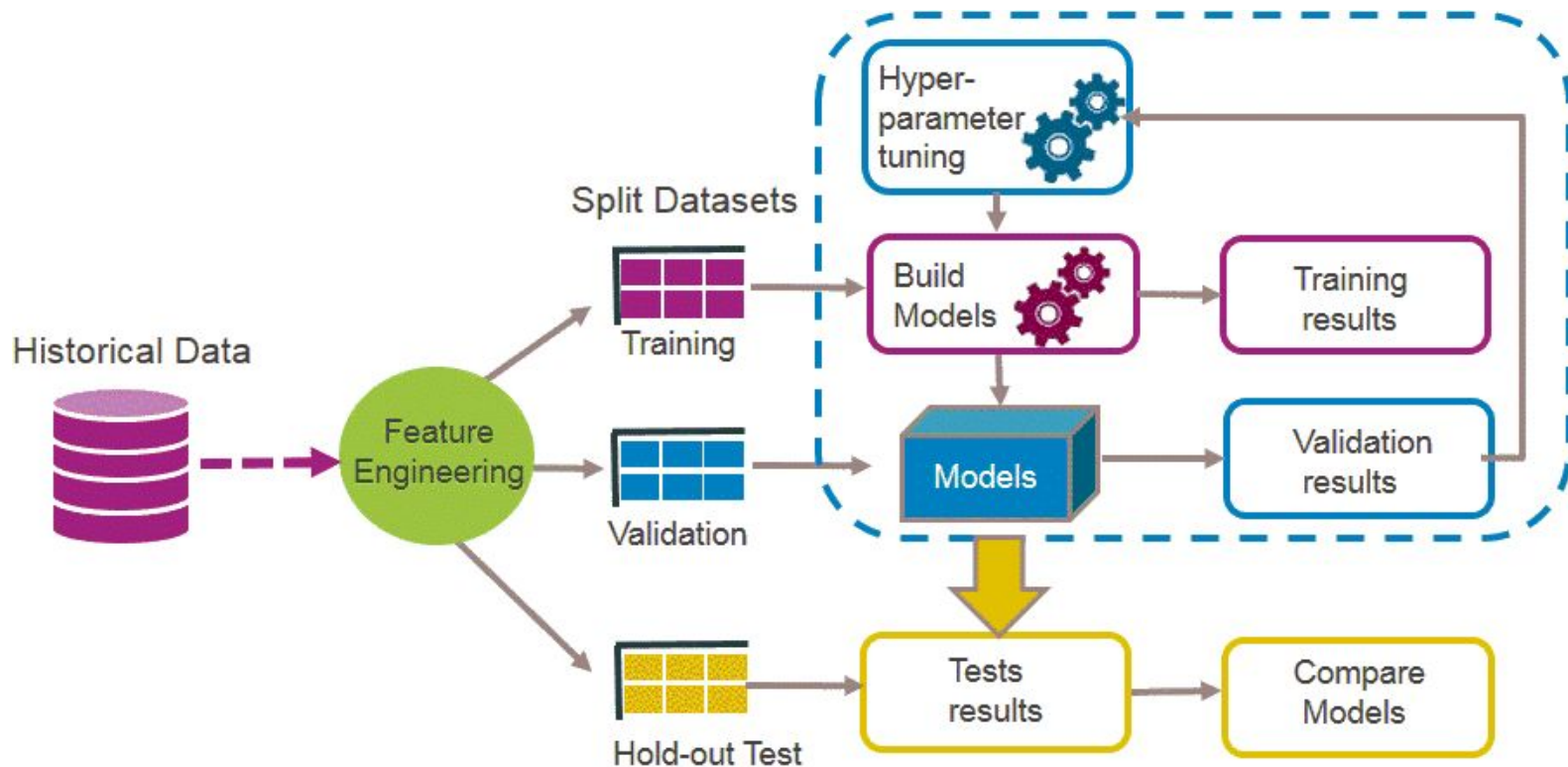
# ML Process

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# The Machine Learning Process



# Choosing the Right Model

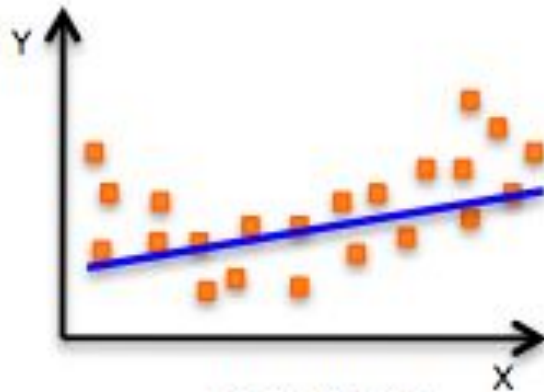


# ML Difficulties

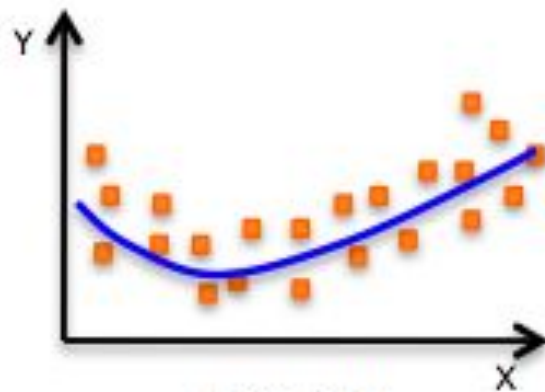
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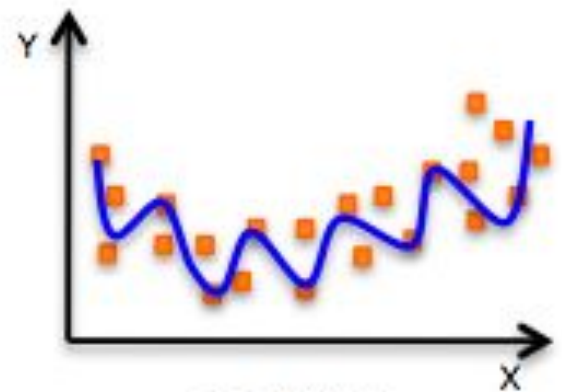
# Overfitting or Underfitting



**Underfitting**

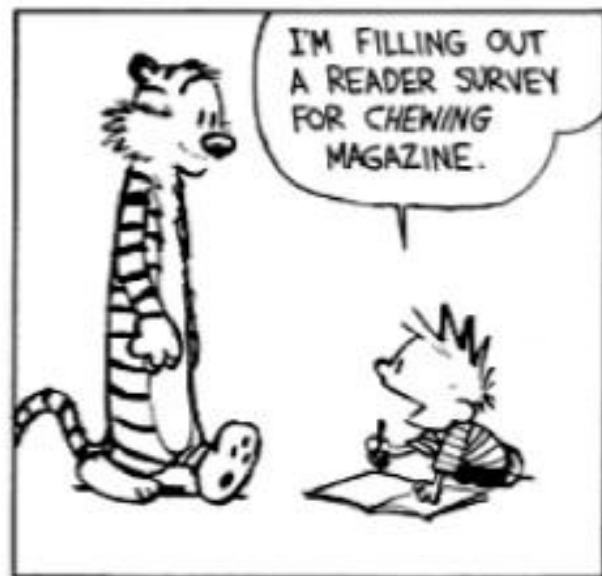


**Just right!**



**overfitting**

# Sampling is Hard

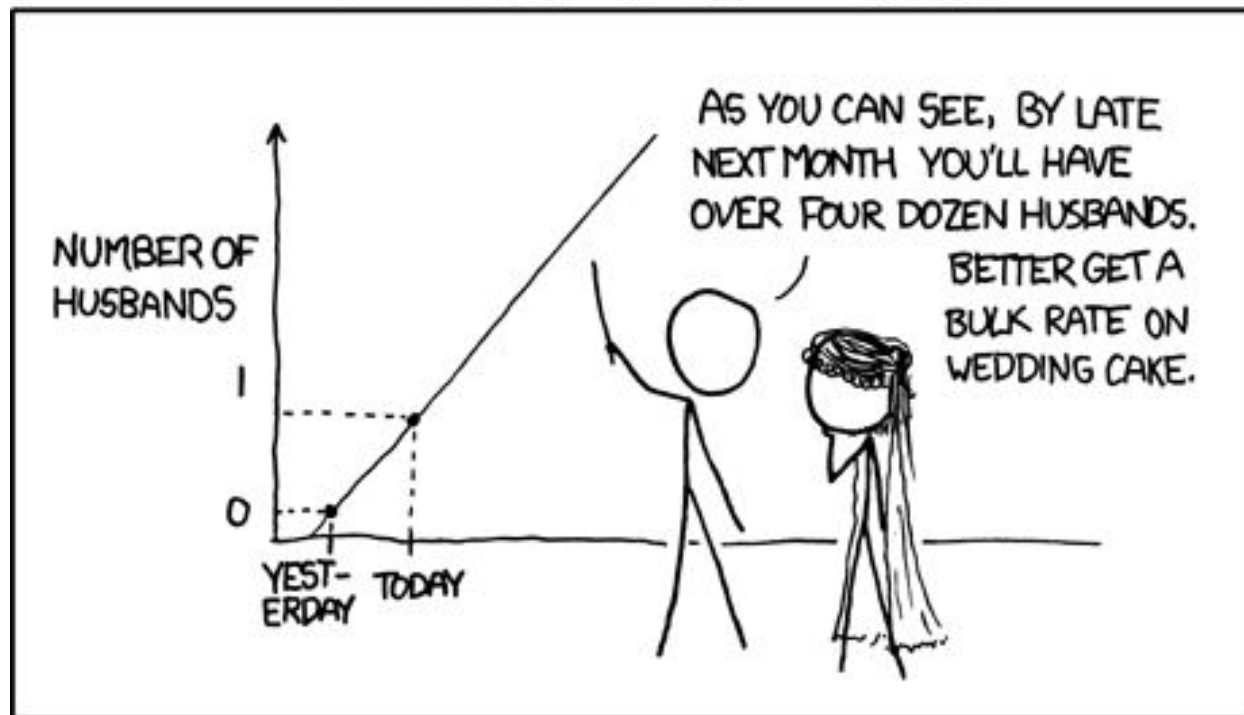


SEE, THEY ASKED HOW MUCH MONEY I SPEND ON GUM EACH WEEK, SO I WROTE, "\$500." FOR MY AGE, I PUT "43." AND WHEN THEY ASKED WHAT MY FAVORITE FLAVOR IS, I WROTE "GARLIC/CURRY."



# Inferences Are Hard

MY HOBBY: EXTRAPOLATING



# Trustworthy Data Is Hard

Word2Vec Google News Vectors

Man » Woman :: King » Queen

Man » Computer Programmer :: Woman » Homemaker

Man » Professor :: Woman » Associate Professor

(it goes on...)

# Thank you!

# Questions?

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