

Machine Learning

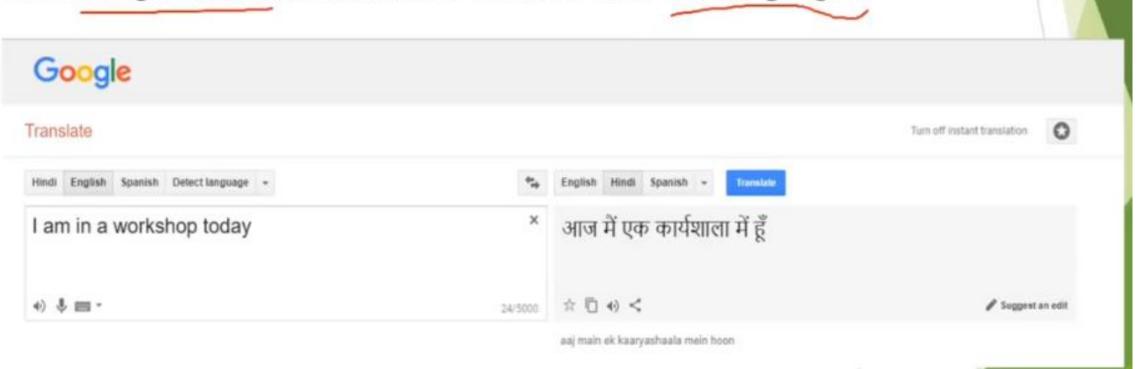
# Introduction

# Welcome

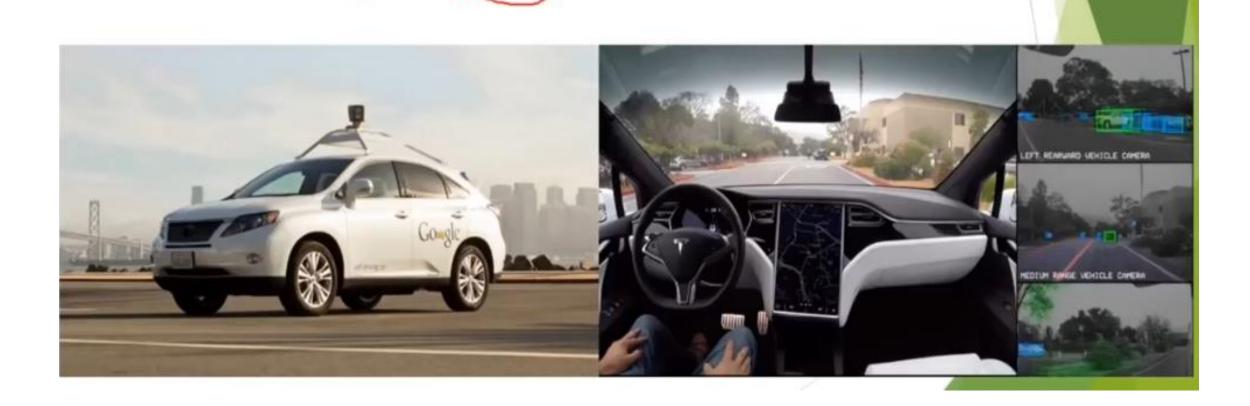
How Google classifies your mails as Spam/Non-Spam?



How Google Translate translates to more than 100 languages?



How they are making Self Driving cars?





How products are recommended on the shopping sites?



## How are these all being possible?



The answer is because of Machine Learning

## Writing Programs To Solve These Problems

Logic for the problems easily solvable by human beings cant be easily implemented because:

- Working of Human Brains is not known to us.
- A generalized program covering many of the existing patterns in the problem domain can not be designed.
- The program will become highly complicated and is likely to miss many possible cases if we try to implement the logic.

## Contd.

Many problems are difficult for humans to solve also because of their incapability in figuring out the patterns.

We expect machines to solve those problems.

E.g.

To compute the probability that a credit card transaction is fraudulent.

It is very hard to write a program to computer this probability because:

- There may not be any rules that are both simple and reliable.
- Fraud is a moving target. The program needs to keep changing.

## Another Paradigm (Machine Learning Approach)



Instead of writing a program by hand for each specific task, we collect lots of examples or experiences belonging to the problem.

It will take the number of example as input along with the answers of each example and gain the experience

Then experience is used reply the answer for new example's.

## What is Machine Learning?

Machine Learning is a branch of the field called Artificial Intelligence which aims to create intelligent systems which do human like jobs by learning from a lot of relevant data.

There are patterns in the data for doing a task and we cannot represent them mathematically. So we use Machine Learning to automatically learn those mathematical representations of patterns from data.

In other words,

To give computers the ability to learn without being explicitly programmed.

### A Definition

Arthur Samuel described it as: "the field of study that gives computers the ability to learn without being explicitly programmed." This is an older, informal definition.

## A Definition by Tom Mitchell

A computer program is said to learn from experience E with respect to some class of tasks T and performance measure P, if its performance at tasks in T, as measured by P, improves with experience E.

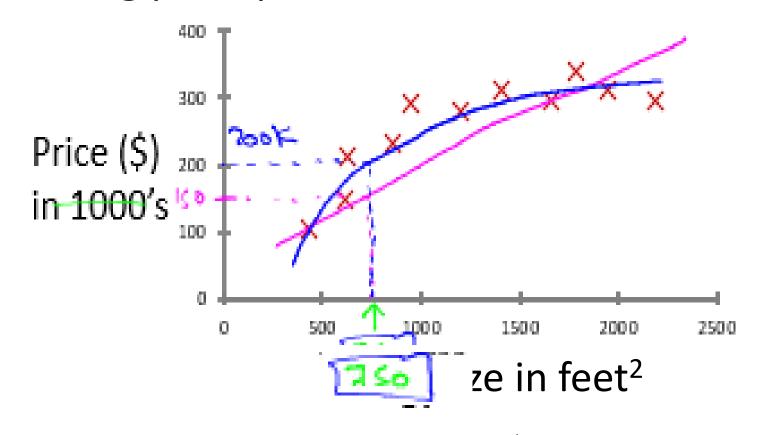
## Machine learning algorithms:

- Supervised learning
- Unsupervised learning

Others: Reinforcement learning, recommender systems.

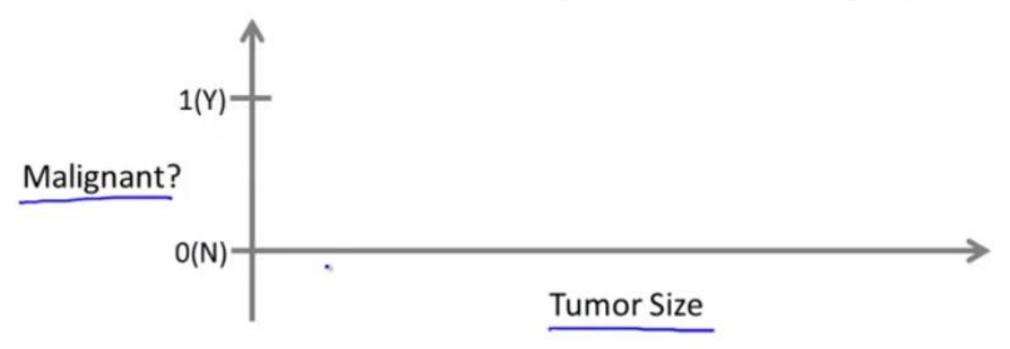
Also talk about: Practical advice for applying learning algorithms.

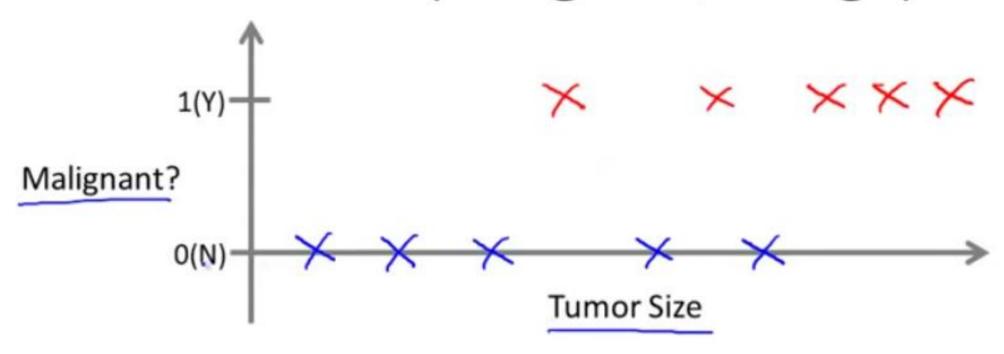
## Housing price prediction.

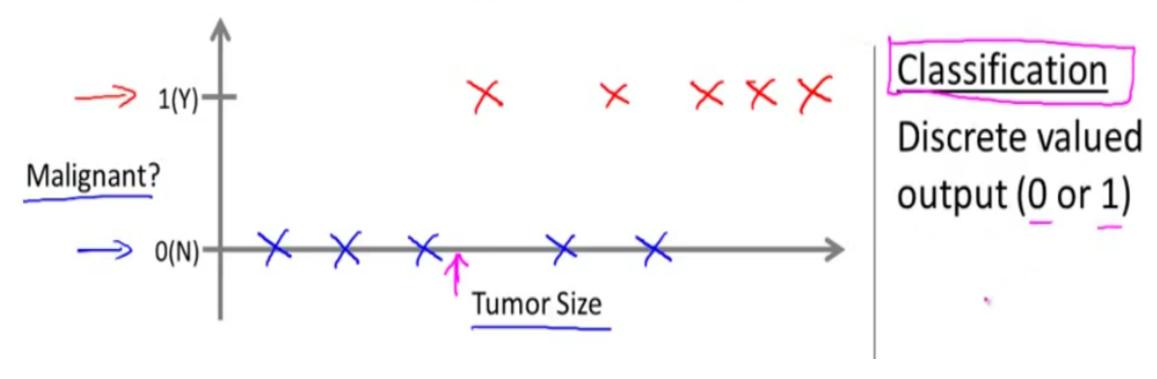


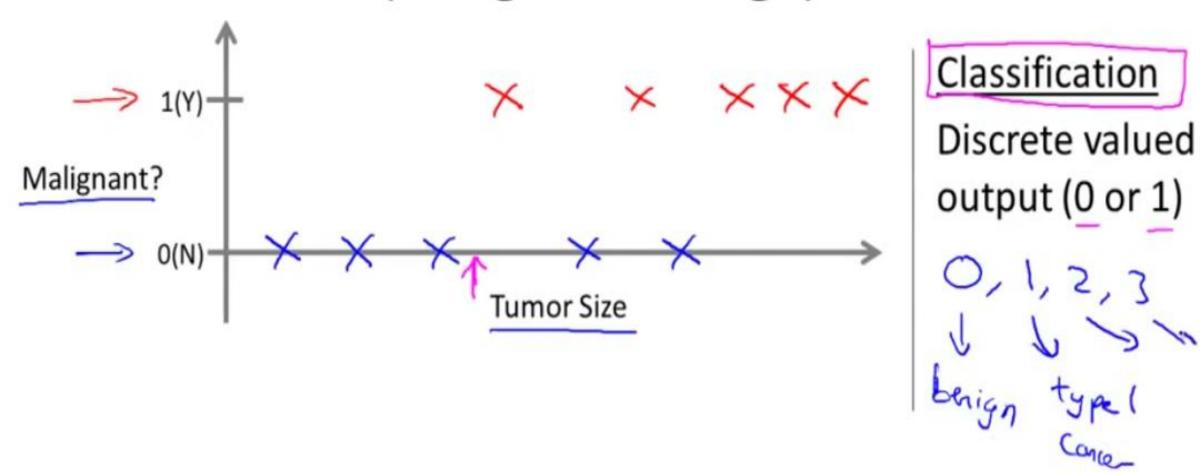
Supervised Learning "right answers" given

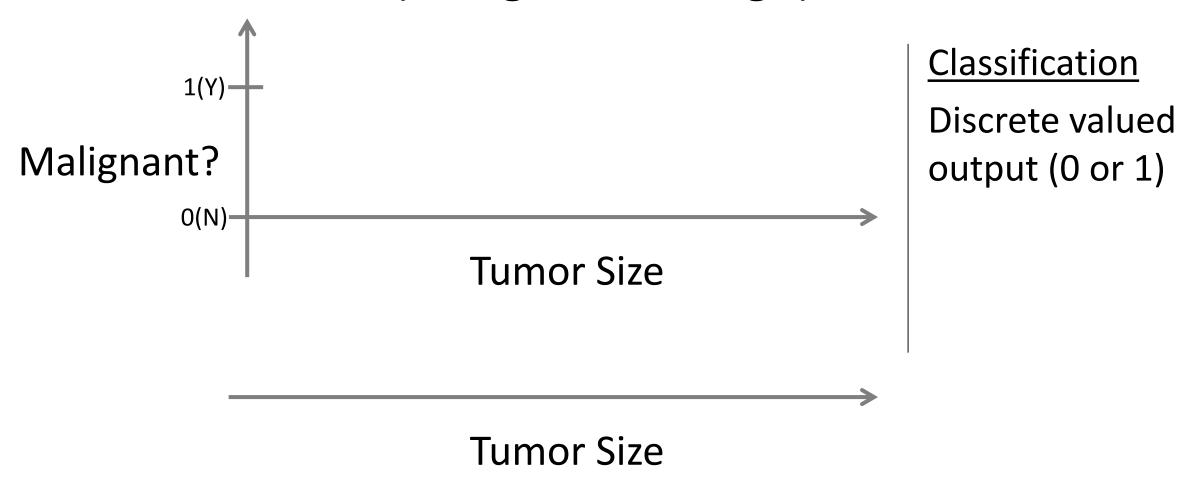
Regression: Predict continuous valued output (price)

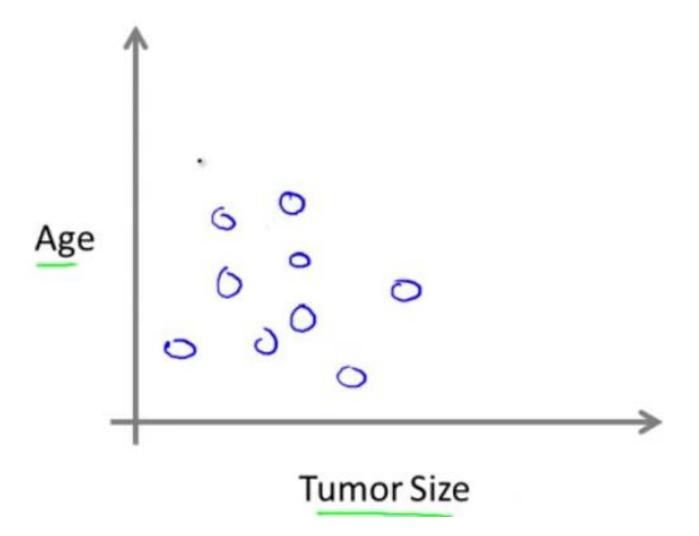


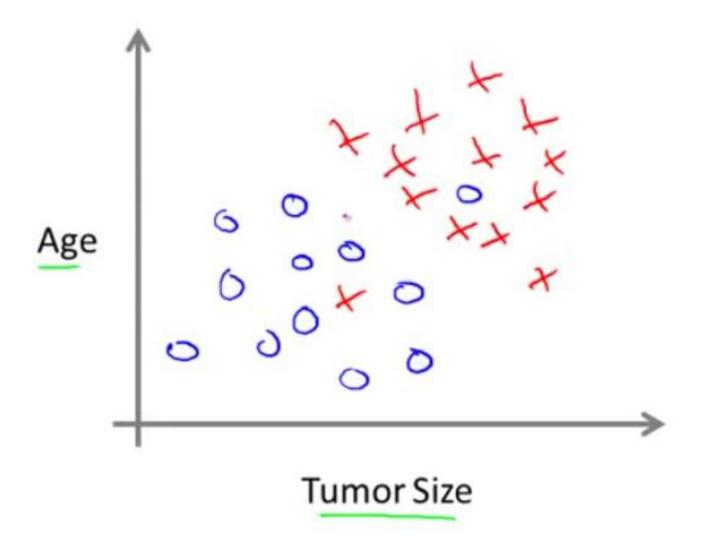


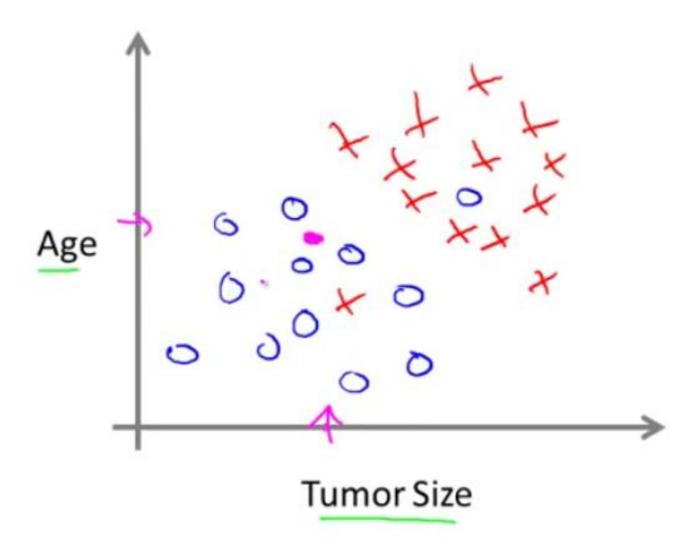


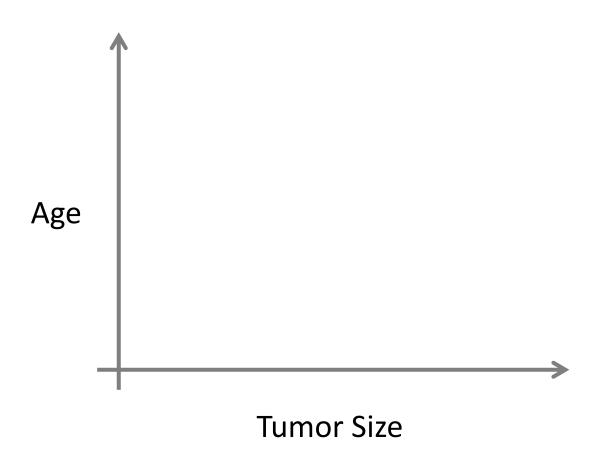












- Clump Thickness
- Uniformity of Cell Size
- Uniformity of Cell Shape

• • •

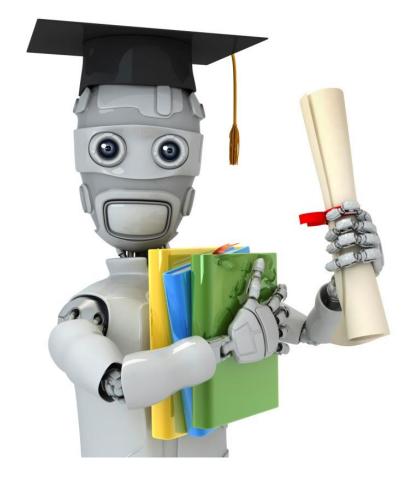
You're running a company, and you want to develop learning algorithms to address each of two problems.

Problem 1: You have a large inventory of identical items. You want to predict how many of these items will sell over the next 3 months.

Problem 2: You'd like software to examine individual customer accounts, and for each account decide if it has been hacked/compromised.

Should you treat these as classification or as regression problems?

Should you treat these as classification or as regression problems?
Treat both as classification problems.
<ul> <li>Treat problem 1 as a classification problem, problem 2 as a regression problem.</li> </ul>
Treat problem 1 as a regression problem, problem 2 as a classification problem.
Treat both as regression problems.

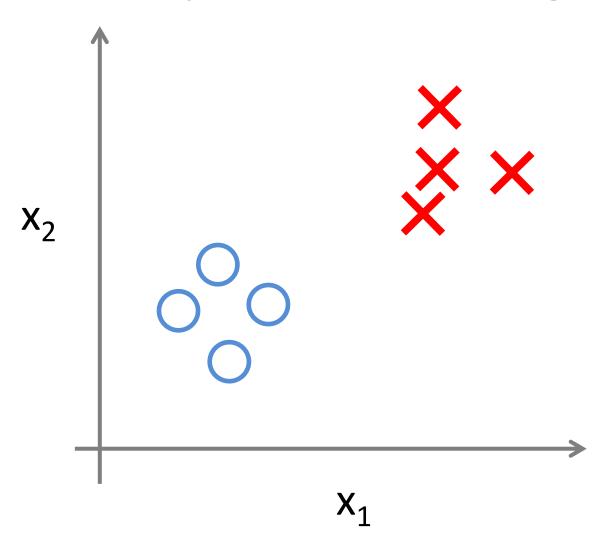


Machine Learning

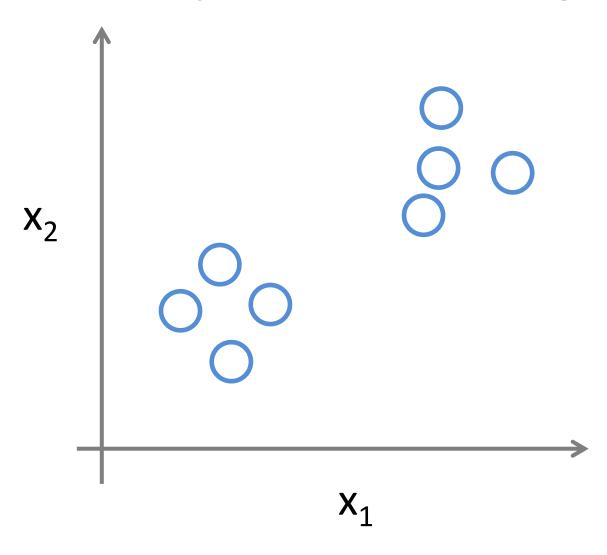
# Introduction

# Unsupervised Learning

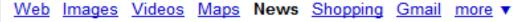
## **Supervised Learning**



## Unsupervised Learning



\_ | - |



andrewyantakng@gmail.com | Web History | Settings ▼ | Sign out



Search News

Search the Web

Advanced news search

### Top Stories

Deepwater Horizon Fed meeting Foreign exchange market Lindsay Lohan

IBM

Tom Brady Toronto

International Film Festival

Paris Hilton

Iran Hurricane Igor

■ Starred ☆

- San Francisco Bay Area
- World
- U.S.
- Business
- Sci/Tech
- More Top Stories
- Spotlight
- Health
- Sports
- Entertainment

### All news

Headlines Images

### Top Stories

Christine O'Donnell »

### White House official denies Tea Party-focused ad campaign

CNN International - Ed Henry - 1 hour ago

Democratic sources say the White House is not considering an ad campaign tying Republicans to the Tea Party. Washington (CNN) -- A top White House official sharply denied a report that claims President Obama's political advisers are weighing a national ...

Tea Party is misplacing the blame, former President Bill Clinton claims New York Daily News

GOP tea party backer defends Christine O'Donnell The Associated Press Atlanta Journal Constitution - Politics Daily - MyFox Washington DC - Salon all 726 news articles »

### US Stocks Climb After Recession Called Over. **Homebuilders Gain**

MarketWatch - Kristina Peterson - 16 minutes ago

NEW YORK (MarketWatch) -- US stocks climbed Monday, gaining speed after a key nonprofit organization officially called the recession over, giving investors a boost of confidence in the gradual economic recovery.

Longest recession since 1930s ended in June 2009, group says Los Angeles Times

Downturn Was Longest in Decades, Panel Confirms New York Times Wall Street Journal - AFP - CNN - USA Today

all 276 news articles »

#### Deepwater Horizon »

### BP Oil Well, Site of National Catastrophe, Dies at One

Vanity Fair - Juli Weiner - 22 minutes ago

The BP oil well, site of the Deepwater Horizon explosion that led to the worst oil spill in US history, died today at one year old.

■ Video: Blown-out BP Well Finally Killed in Gulf to The Associated Press Weiss Doubts BP Would End Operations in Gulf of Mexico: Video Bloomberg CNN International - Wall Street Journal (blog) - The Guardian -New York Times

all 2.292 news articles »



Recent



Hurricane Igor lashes Bermuda USA Today - Gerry Broome - 5 minutes ago

'Explain what you want from us,' reads frontpage editorial

msnbc.com - Olivia Torres - 10 minutes ago



☆ 🔻

RECESSIO

MyFox Phila...

### Crisis response: Pakistan floods

### San Francisco Bay Area - Edit

Clorox »

Bay Biz Buzz: Clorox close to selling STP, Armor All

San Jose Mercury News - 48 minutes ago all 24 articles »



San Jose Mercury News - Bruce Newman -

1 hour ago

Jon Sylvia »

Martinez man still unconscious as police investigate weekend shooting

San Jose Mercury News - Robert Salonga -48 minutes ago - all 6 articles »



Sarkozy rages at EU 'humiliation'

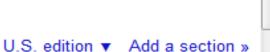
Financial Times - Peggy Hollinger -Sep 16, 2010



Reuters



☆▼



☆▼

☆ 🔻

☆▼

☆ 🔻





















































Solution blogs.wsj.com/source/2010/09/20/bp-kills-macondo-but-its-legacy-lives-on/





WSJ.com

Market Watch

BARRON'S All Things Digital.

FINS

SmartMoney

SEARCH

### THE WALL STREET JOURNAL.

Log In Register For Free Subscribe Now, Get 2 Weeks Free

PREVIOUS



NEXT >>

Financial Services Transport

Leisure

Insurance

Oil & Gas

Sport

Caught on the Web

Betting

Technology

SEPTEMBER 20, 2010, 12:44 PM GMT

Print

### BP Kills Macondo, But Its Legacy Lives On

Search The Source

SEARCH

Article

Email

Comments (2)















### About The Source

Follow Us:



THE SOURCE HOME PAGE »





By James Herron

BP confirmed late Sunday that the Macondo well that leaked almost five million barrels of oil into the Gulf of Mexico has been permanently sealed, but the well will continue to affect BP and the wider oil industry for many years.

The most immediate worry for BP and its shareholders is how the authorities will apportion blame for the spill. BP's own investigation spread responsibility across



Associated Press

Fire boat response crews battled the blazing remnants of the off shore oil rig Deepwater Horizon on April 21, 2010.

The Source is WSJ.com Europe's home for rapid-

fire analysis of the day's big business and finance stories. It is edited by Lauren Mills, based in London.



### Most Recent

Comments

- Who Needs Plaza II Anyway
- Will Banks Be Forced to Split Retail And Banking Arms?
- Timing of Ratings Award Intriguing
- BP Kills Macondo, But Its Legacy Lives On
- We Already Need a Sequel to Basel III.

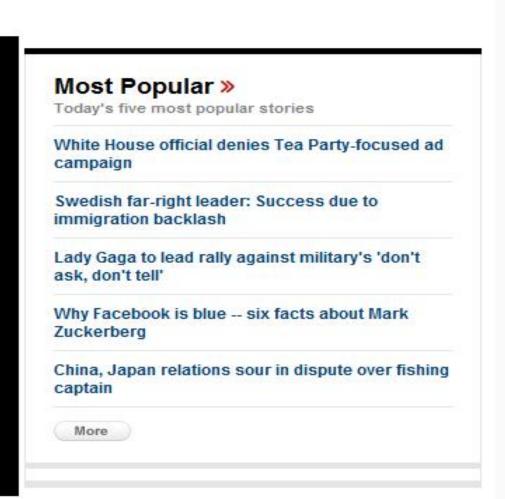


# Allen: Well is dead, but much Gulf Coast work remains

By the CNN Wire Staff

September 20, 2010 -- Updated 1317 GMT (2117 HKT)





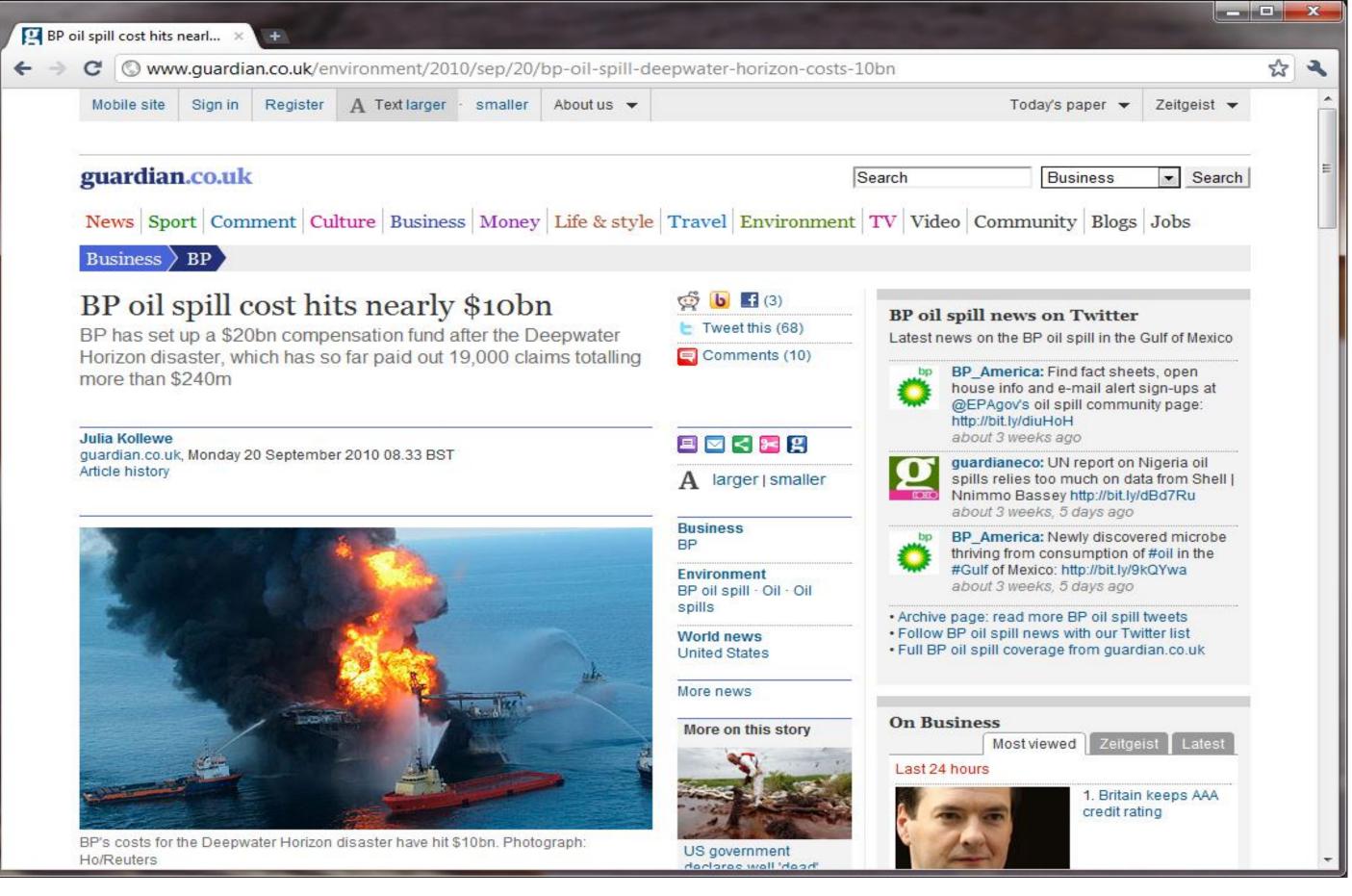
□ Twitter

Recommend Be the first of your friends to recommend this.

Save

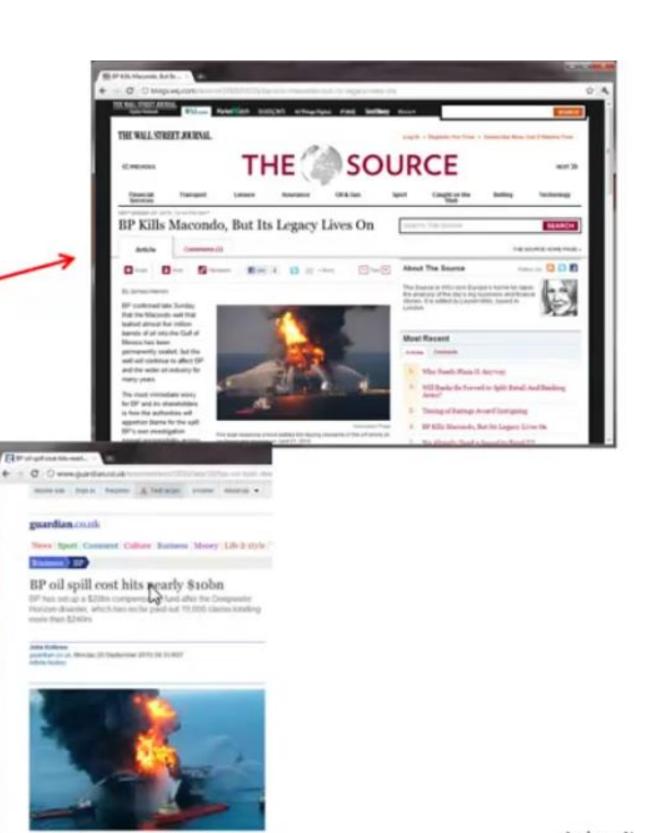
STORY HIGHLIGHTS

(CNN) -- The ruptured Macondo well, a mile under the Gulf of Mexico off the Louisiana coast, has been pronounced dead

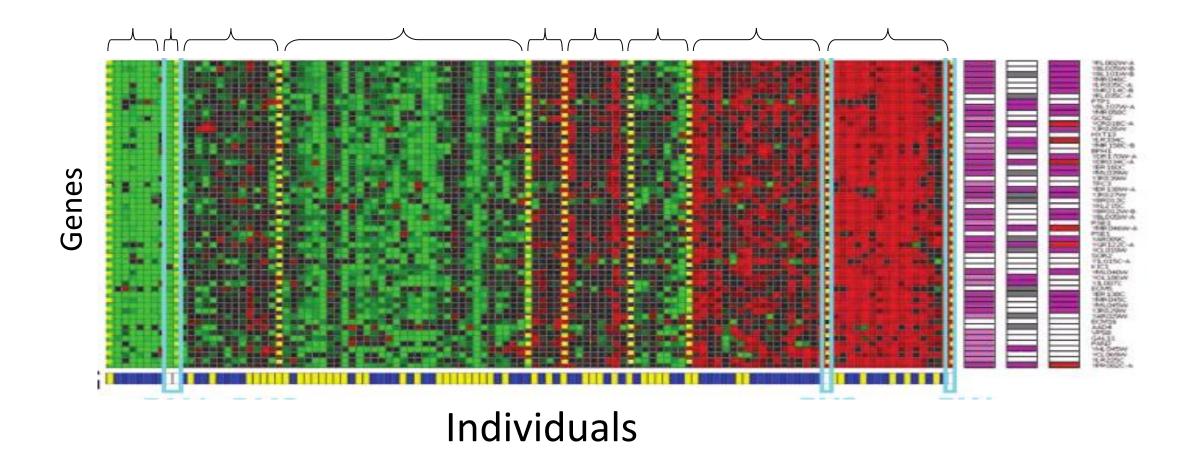








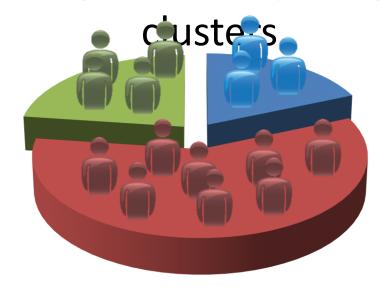
Andrew N



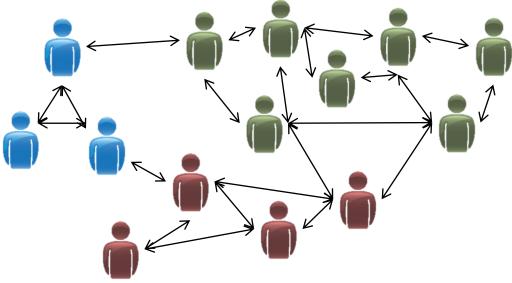
[Source: Su-In Lee, Dana Pe'er, Aimee Dudley, George Church, Daphne Koller]



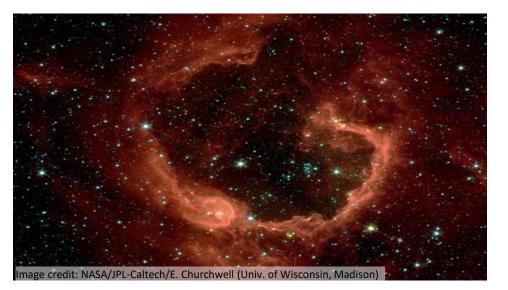
Organize computing



Market segmentation

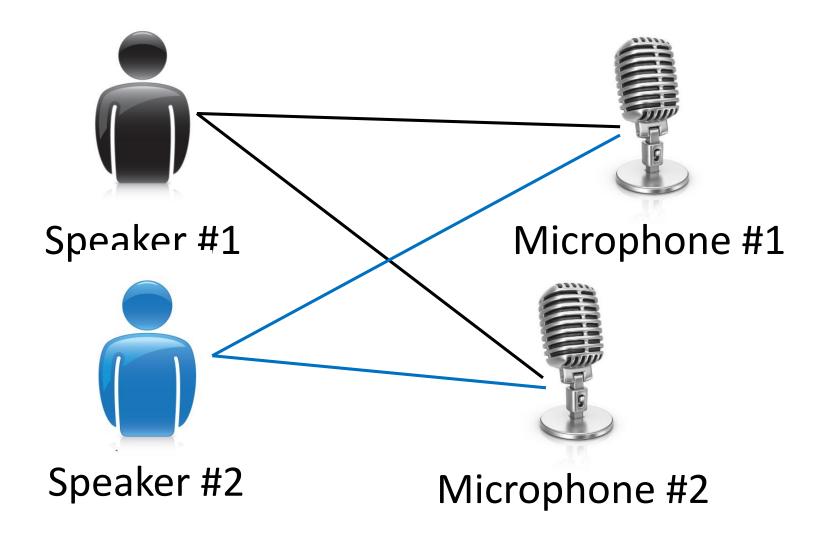


Social network



Astronomical data analysis

# Cocktail party problem



# Cocktail party problem algorithm

$$[W,s,v] = svd((repmat(sum(x.*x,1),size(x,1),1).*x)*x');$$

[Source: Sam Roweis, Yair Weiss & Eero Simoncelli]

Following examples, which would you address using an unsupervised learning algorithm? (Check all that apply.)

Given email labeled as spam/not spam, learn a spam filter.

Given a set of news articles found on the web, group them into set of articles about the same story.

Given a database of customer data, automatically discover market segments and group customers into different market segments.

Given a dataset of patients diagnosed as either having diabetes or not, learn to classify new patients as having diabetes or not.