

Introduction to Machine Learning Using Python

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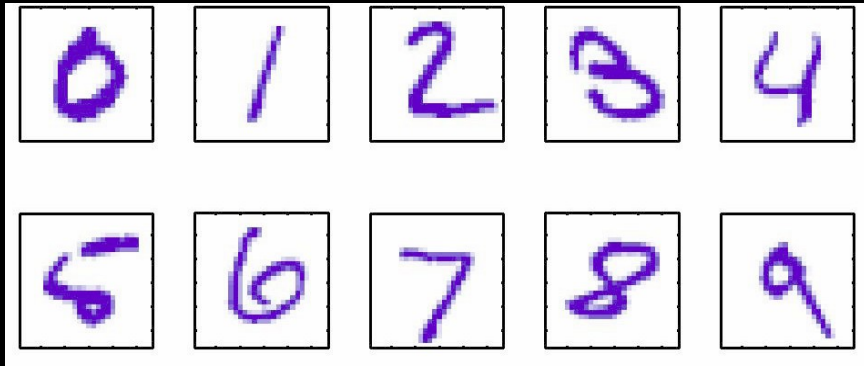
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Definition:

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

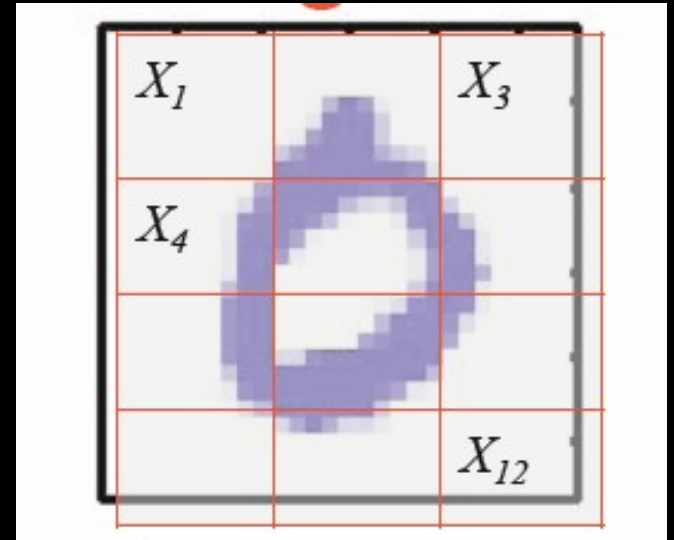
Example:

Classification: Digit Recognition



Input (X_i): Image Features

Output (Y): Class Labels $\{ y^0, y^1, \dots, y^9 \}$



Features(X_i):

Proportion of pixels in
Each of the 12 cells
 X_i where $i=1,2,\dots,12$

$x_i^0 = 0-10\%$
 $x_i^1 = 10-20\%$

} $Val(X_i) = 10$

No of parameters = $10^{12} - 1$

Handcrafted Rules will result in a large number of rules and exceptions

– We need ML in cases where we cannot directly write a program to handle every case

So it's better to have a machine that *learns* from a large training set

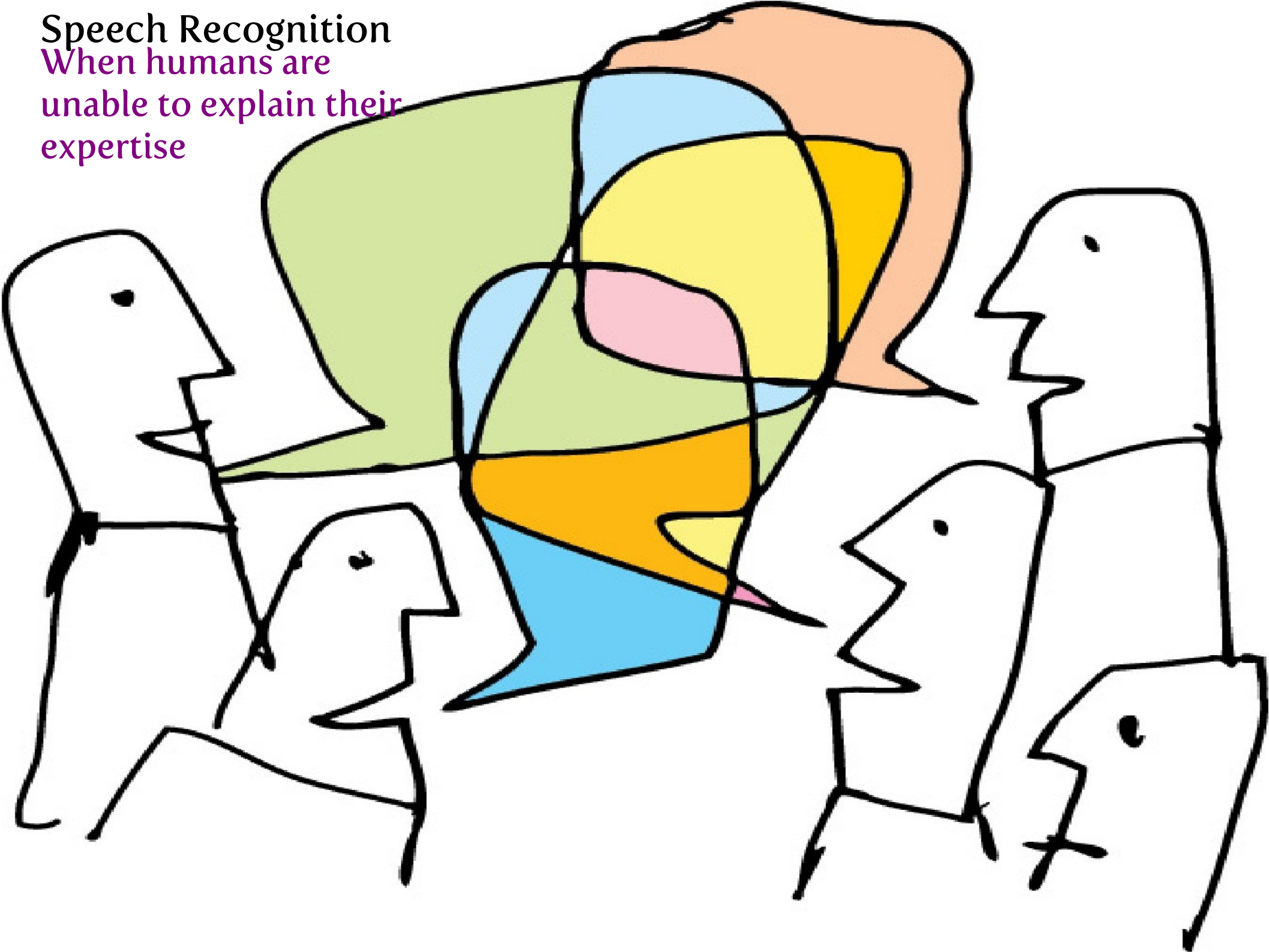
So, according to the definition earlier:

Task (T): recognizing and classifying handwritten words within images

Performance measure (*P*): percent of words correctly classified

Training experience (E): a database of handwritten words with given classifications

Speech Recognition
When humans are
unable to explain their
expertise



Where **ML** is used...

Inbox

Outbox

Spam (3015)

Trash



Top Stories

National Collegiate Athletic Association
Boston Celtics
Abby Sunderland
BP
Big Ten Conference
New York Mets
South Africa
Chicago Blackhawks
Philadelphia Phillies
Iran

Starred

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Washington Post - Joel Achenbach, Juliet Eilperin - 17 minutes ago
Cleanup and containment efforts continue at the Gulf of Mexico site of the oil spill following the Deepwater Horizon explosion.
By Joel Achenbach and Juliet Eilperin Pick a number: 12600 barrels
Anger rises along with spill size estimate Houston Chronicle
New Estimates Double Rate of Oil That Flowed Into Gulf New York Times
The Associated Press - San Jose Mercury News - Citizens for Legitimate Government - ABC News - Wikipedia: Deepwater Horizon oil spill
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ABC Online - 2 hours ago
Jessica Watson's family say their thoughts and prayers are with a solo teenage sailor missing in mountainous seas in the middle of the Indian Ocean.
Video: Teen May Be Lost at Sea During Solo Sail The Associated Press
Teenage sailor in ocean distress BBC News
CNN - New York Times - Xinhua - The Press Association - Wikipedia: Abby Sunderland
all 1,370 news articles »



Telegraph.c...

FBI Opens Probe Into iPad E-Mail Security Breach

BusinessWeek - Karen Gullio, Greg Bensinger - 1 hour ago
June 10 (Bloomberg) -- The Federal Bureau of Investigation started an investigation of a security breach in AT&T Inc.'s wireless network that exposed the e-mail addresses of users of Apple Inc.'s iPad 3G.
Video: iPad AT&T Hacker Revealed Weev Escher Auerheimer Goatse Security White Hat FBI Investigates YouTube
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eWorld Post...

NT Media Launches Social Media Channels on Twitter and Facebook

MarketWatch (press release) - 6 hours ago
LOS ANGELES, Jun 10, 2010 (BUSINESS WIRE) -- NT Media Corp. (www.ntmedia.tv) (OTC:NTMI), a developer and operator of media, social networking and community ...
Fortune 100 Companies' Social Media Savvy (STATS) Huffington Post (blog)
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The Age

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BusinessWeek - Brian Womack - 2 hours ago
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msnbc.com

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msnbc.com - Gregory Ellwood - 34 minutes ago
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Karl Rove: Obama and the Trouble With Voting 'Present'

Wall Street Journal - Karl Rove - 12 hours ago

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CNN - Elizabeth Landau - Jun 8, 2010

Studies Show Jews' Genetic Similarity

New York Times - Nicholas Wade - Jun 9, 2010

In Medium Raw, Bourdain Is the Last Honest Man

TIME - Josh Ozersky - Jun 8, 2010



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New York Times



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Army inquiry finds 211 graves mishandled at Arlington Cemetery

CNN - Mike Mount - 3 hours ago

In Sweden, the Men Can Have It All

New York Times - Katrin Bennhold - Jun 9, 2010

Iran Sanctions Pass in the U.N.

TIME (blog) - Joe Klein - Jun 9, 2010

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Webmonkey (blog) - Scott Gilbertson - 7 hours ago

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CNN - John D. Sutter - Jun 8, 2010

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TIME (blog) - Adam Sorensen - Jun 8, 2010



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New York Times - Pam Belluck - Jun 9, 2010

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Los Angeles Times - Mitchell Landsberg - Jun 9, 2010

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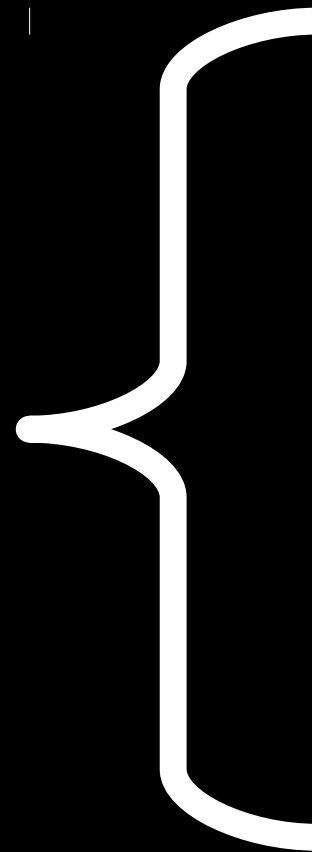
WATSON

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Major Classes of Learning Algorithms:

**Learning
Algorithms**

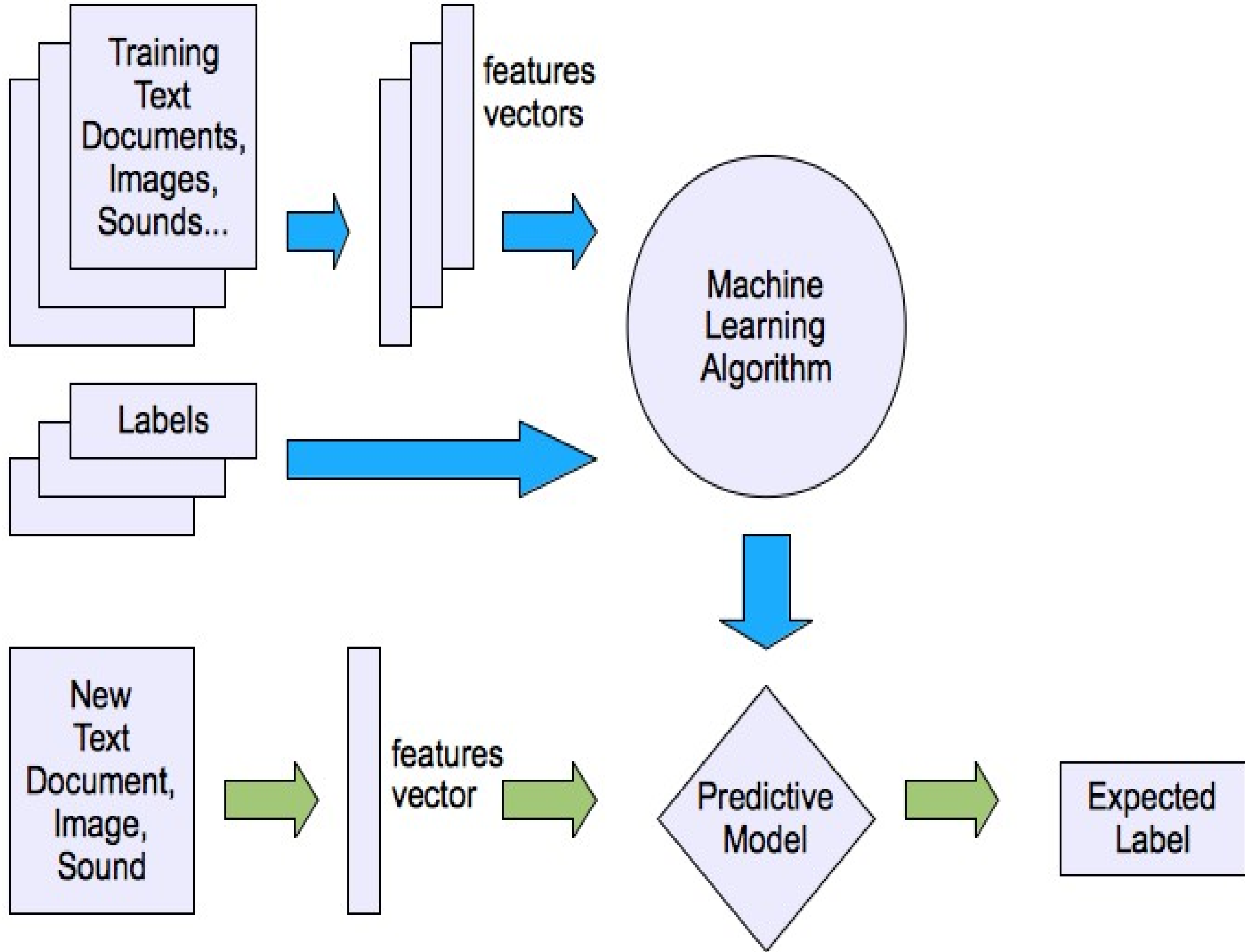


Supervised Learning

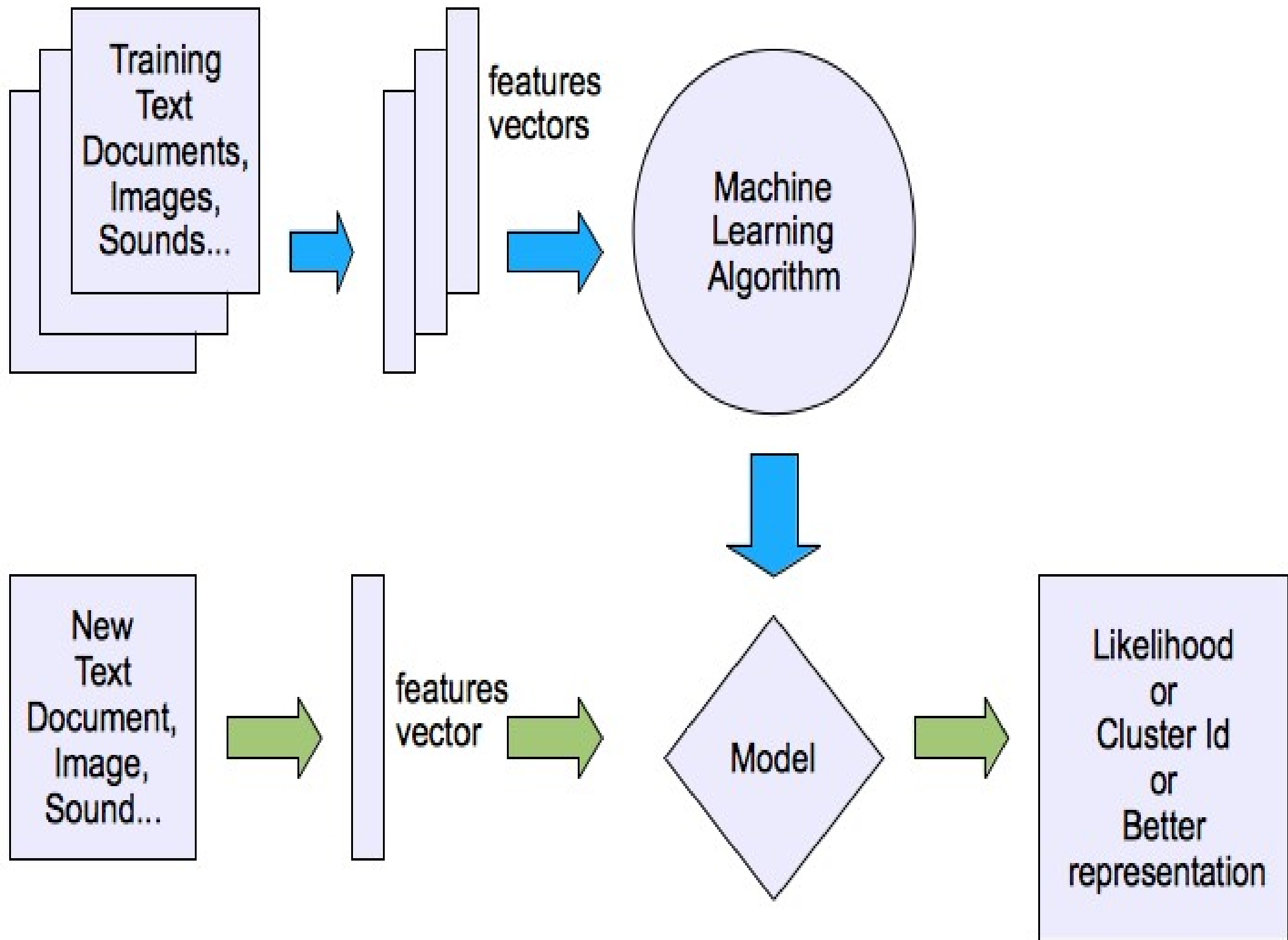
Unsupervised Learning

Reinforcement Learning

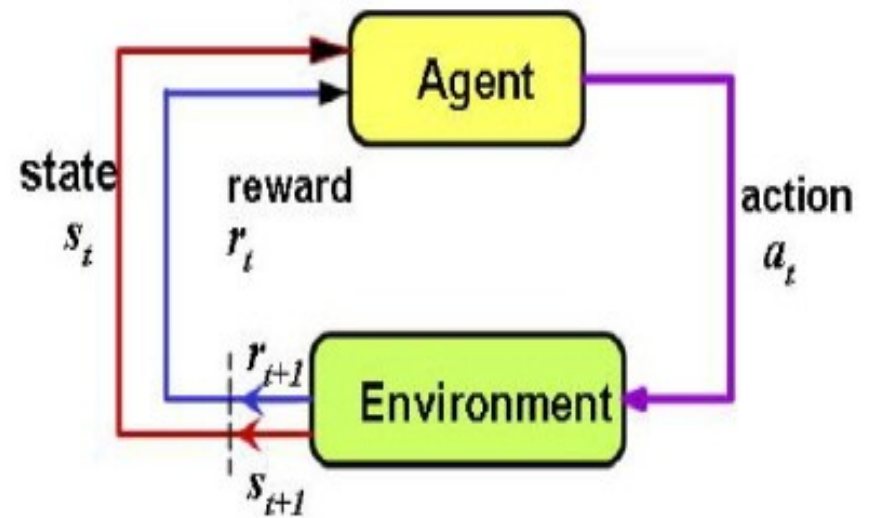
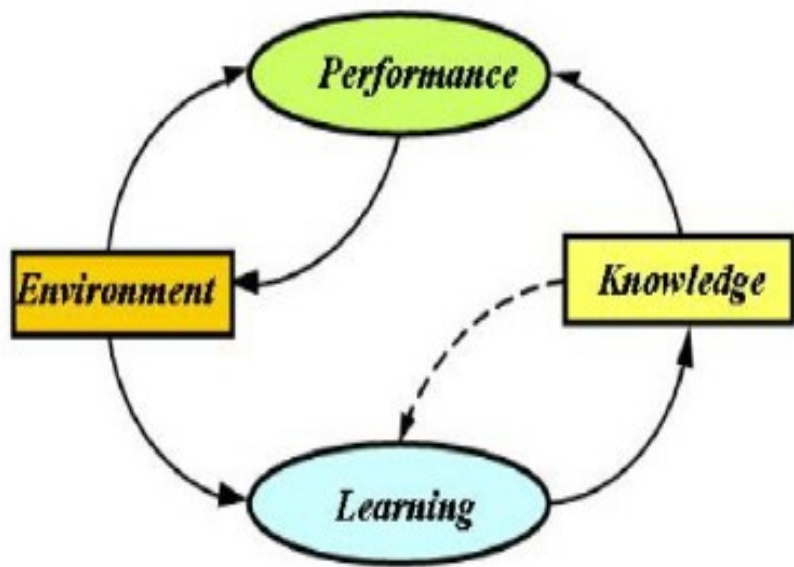
Supervised Learning:



Unsupervised Learning:



Reinforcement Learning:





Good Robot Bad Robot

