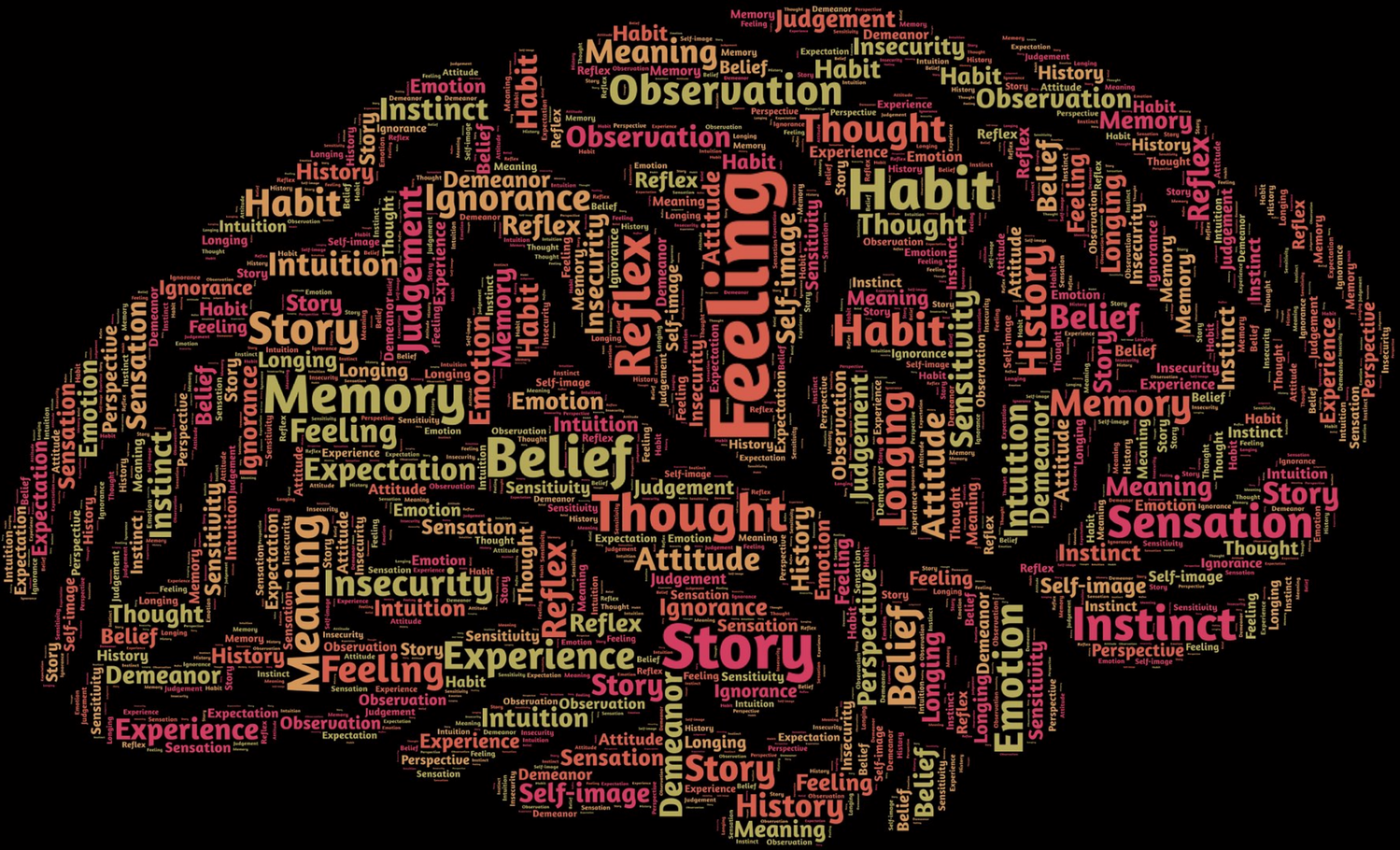
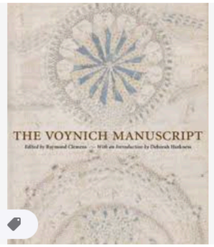

Habit
Meaning
Judgement
Insecurity
Observation
Habit
Habit
History
Observation
Memory
Thought
Habit
Habit
Reflex
Belief
Feeling
Longing
Habit
Thought
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Demeanor
Ignorance
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Belief
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Memory
Instinct
Attitude
Sensitivity
Habit
Belief
Ignorance
Story
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Feeling
Story
Judgement
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Self-image
Attitude
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Habit
Belief
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Emotion
Perspective
Longing
Longing
Memory
Emotion
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Expectation
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Sensation
Perspective
Demeanor
Self-image
Belief
Longing
Demeanor
Emotion
Sensitivity
Longing
Feeling
Sensitivity
Belief
Belief
History
Meaning

Google voynich

book | manuscript | yale university | proto romance | manuscrito voynich | voynich code | wilfrid voynich | mysterious | mysterious voynich | decoded | anci



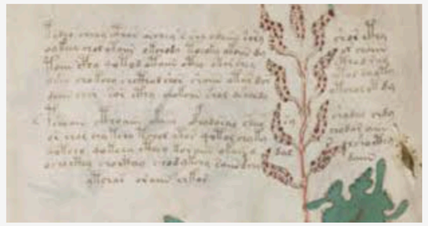

The Voynich Manuscript | ...
standaardboekhandel.be



Voynich manuscript - Wiki...
en.wikipedia.org



Has the medieval "Voynich code" finally been cra...
newatlas.com



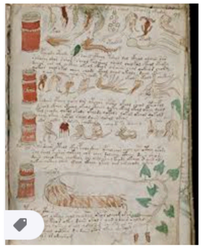
Voynich Manuscript | Beinecke Rare Book & Manuscript...
beinecke.library.yale.edu



Voynich manuscript | illustr...
britannica.com



Here's What You Need to Kn...
smithsonianmag.com



The Voynich Manuscrip...
amazon.com



Has Voynich Manuscript Been Decoded? ...
sci-news.com




The Voynich manuscript was ...
nl.pinterest.com



Has Yale's mysterious Voynich Manuscr...
theartnewspaper.com



The Unread: The Myste...
newyorker.com



Has Yale's mysterious Voynich Manuscript finally been ...
theartnewspaper.com

# AN ASSIGNMENT IS A PROBLEM FOR WHICH YOU MUST SEEK A SOLUTION

YOU DON'T LOOK FOR SOLUTIONS ON GOOGLE, YOU MUST SEARCH AND FIND THEM YOURSELF

# A ROADMAP FOR PROBLEM SOLVING

1. What is the problem you are presented with? (ORIENTATE).

2. What exactly is expected? (TO PREPARE)

3. Work out your answer schematically (EXECUTE)
    1. What's the problem?
    2. How can you solve the problem?
    3. How do you / or the machine collect data? What training data (if relevant) do you collect?
    4. Do you need to structure the data? If so, how and in what format?
    5. How are data processed? Which "processing techniques" are you going to use? Which steps?
    *Of course you don't go for "manual work", but for automation. This may include: algorithms, learning methods ...*
    6. How are the data "exported" and / or displayed?

4. Convert your schedule into clear and readable text, possibly with images and / or tables.

5. Read everything again thoroughly. Is the answer comprehensible / readable for someone who does not know anything about the subject matter? (TO REFLECT)

# PROBLEM-SOLVING WAY OF THINKING

## A HALLMARK OF HUMAN INTELLIGENCE

# HOW DO ALGORITHMS WORK?

## A LOOK BEHIND THE SCENES OF THE PROGRAMMER

# A WAY TO SOLVE A PROBLEM IN A FINITE NUMBER OF STEPS

## AN EXAMPLE:

ADD 1000 BOOKS TO AN ONLINE BOOKSTORE+WEBSHOP.

1. FOR THIS YOU NEED TO COLLECT INFORMATION.
2. FOR EACH BOOK YOU NEED THE AUTHOR, THE SUMMARY AND THE COVER IMAGE.
3. STORE THAT INFORMATION IN A STRUCTURED WAY IN YOUR OWN DATABASE.
4. THE BOOKS MUST BE VISIBLE ON A WEBSITE.

## A SOLUTION:

1. MANUAL SEARCH FOR INFORMATION
2. COPY AND PASTE INFORMATION FROM OTHER SITES INTO A WORD DOCUMENT
3. …

# A FASTER SOLUTION:

1. USING WEB SCRAPING TECHNIQUES
2. WEB SCRAPING ALGORITHM
    1. SCRAPES DATA FROM OTHER SITES
    2. COPIES INFORMATION TO OWN DATABASE
    3. COPIES PHOTOS TO OWN FOLDER
3. WRITE CRUD CODE TO READ AND DISPLAY DATABASE ON WEBSITE

# WEBSCRAPING CODE

```php
<?php
include "../engine/dom.php";
header('Content-Type: application/json');

$result = array(
    "text" => "",
    "author" => "",
    "cover" => ""
);
    //prd-description

    $url = "https://www.standaardboekhandel.be/p/" . $_GET["isbn"];

    $html = file_get_html($url);
    $info = $html->find('[data-webid=prd-description]');

    foreach($info as $element){
        $result["text"] = trim($element->innertext);
    }

//data-webid="prd-subtitlefilter"
    $info = $html->find('[data-webid=prd-subtitlefilter]');
    foreach($info as $element){
        $result["author"] = trim($element->innertext);
    }

//c-product__image c-slider__image o-ar__element o-ar__element--scale-down js-lazyload loaded
//
    $result["cover"] = "https://media.standaardboekhandel.be/-/media/mdm/product/". $_GET["isbn"]
    ."/frontImagesLink.img";

echo json_encode($result, JSON_PRETTY_PRINT);

?>
```

# CRUD CODE

```php
<?php
ini_set('display_errors', 1);
ini_set('display_startup_errors', 1);
error_reporting(E_ALL);

include "../engine/fenx.conf.php";
include "../engine/fenx.engine.php";
header('Content-Type: application/json');


$fnx = new FNX();
$fnx->query("update books set author=:author, description=:description, cover=:cover where id=:id");

$description = nl2br($_POST["description"]);
$description = str_replace("<br />", "<br/>", $description);
$description = str_replace("<br/><br/>", "<br/>", $description);
$description = str_replace("<br/><br/><br/>", "<br/>", $description);

$fnx->bind(":description", $description);
$fnx->bind(":author", $_POST["author"]);
$fnx->bind(":id", $_POST["id"]);

$cover = $_POST["cover"];
if(strpos($_POST["cover"],"http") > -1){
    $isbn = $_POST["isbn"];
    file_put_contents("images/" . $isbn . ".jpg", file_get_contents($_POST["cover"]));
    $cover = "images/" . $isbn . ".jpg";
}
$fnx->bind(":cover", $cover);

$fnx->execute();

echo json_encode($_POST);
?>
```

# 1. PROGRAMMING

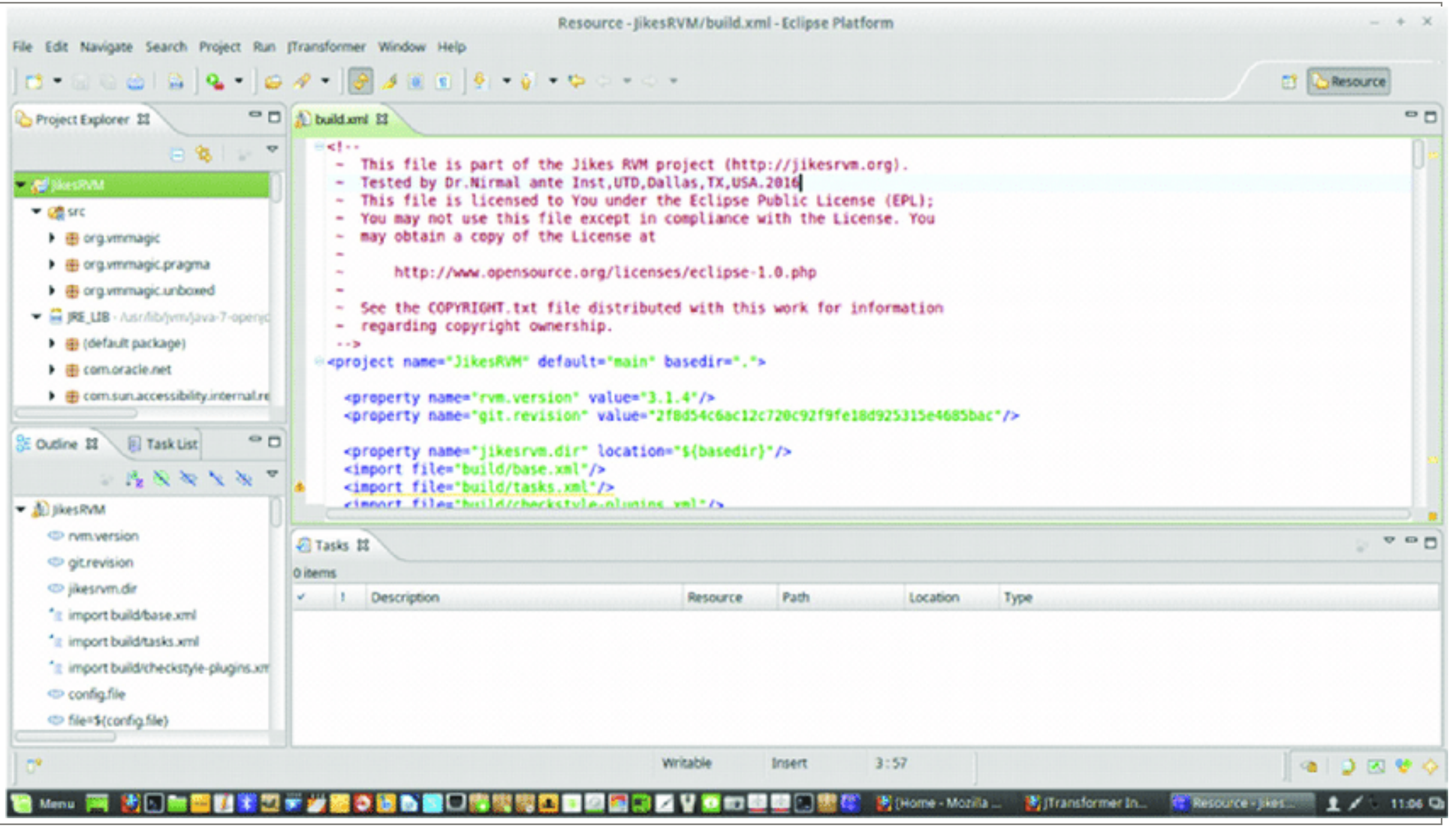
## A LOOK BEHIND THE SCENES OF THE PROGRAMMER

## PROGRAMMING

1. Very “strict” spelling and grammar
2. Short instruction words: if, else, foreach, while
3. Use of () and {} and [] in many languages

## SOFTWARE

1. IDE (integrated development environment)
2. Editor


Resource - JikesRVM/build.xml - Eclipse Platform
File Edit Navigate Search Project Run JTransformer Window Help
Resource
Project Explorer
JikesRVM
src
org.vmmagic
org.vmmagic.pragma
org.vmmagic.unboxed
JRE_LIB - /usr/lib/jvm/java-7-openjd
(default package)
com.oracle.net
com.sun.accessibility.internal.re
Outline
Task List
JikesRVM
rvm.version
git.revision
jikesrvm.dir
import build/base.xml
import build/tasks.xml
import build/checkstyle-plugins.xm
config.file
file=${config.file}
build.xml
<!--
~ This file is part of the Jikes RVM project (http://jikesrvm.org).
~ Tested by Dr.Nirmal ante Inst,UTD,Dallas,TX,USA.2016
~ This file is licensed to You under the Eclipse Public License (EPL);
~ You may not use this file except in compliance with the License. You
~ may obtain a copy of the License at
~
~ http://www.opensource.org/licenses/eclipse-1.0.php
~
~ See the COPYRIGHT.txt file distributed with this work for information
~ regarding copyright ownership.
-->
<project name="JikesRVM" default="main" basedir=".">
<property name="rvm.version" value="3.1.4"/>
<property name="git.revision" value="2f8d54c6ac12c720c92f9fe18d925315e4685bac"/>
<property name="jikesrvm.dir" location="${basedir}"/>
<import file="build/base.xml"/>
<import file="build/tasks.xml"/>
Tasks
0 items
Description
Resource
Path
Location
Type
Writable
Insert
3 : 57
Menu
JTransformer In...
Resource - JikesR...
11:06


/private/var/folders/7y/lj6xr5v52v34l62p49y9_jr00000gq/T/6df4d7c1-d6c1-4539-8286-1d3164dbd63c/www/fenx/test/getbookinfo.php (mr-structure) — Brackets
Geopend
booksml.php
getbookinfo.php
crowl.pages.php
lecturerinfo.php
booksprices.php
Naamloos-1
mr-structure
example.html
example.js
mr-structure
<?php
include "../engine/dom.php";
header('Content-Type: application/json');
$result = array(
"text" => "",
"author" => "",
"cover" => ""
);
//prd-description
$url = "https://www.standaardboekhandel.be/p/" . $_GET["isbn"];
$html = file_get_html($url);
$info = $html->find('[data-webid=prd-description]');
foreach($info as $element){
$result["text"] = trim($element->innertext);
}
//data-webid="prd-subtitlefilter"
$info = $html->find('[data-webid=prd-subtitlefilter]');
foreach($info as $element){
$result["author"] = trim($element->innertext);
}
//c-product__image c-slider__image o-ar__element o-ar__element--scale-down js-lazyload loaded
Regel 29, Kolom 123 — 33 Regels
INS
UTF-8
PHP
Tab Grootte: 4

PROGRAMMING LANGUAGE

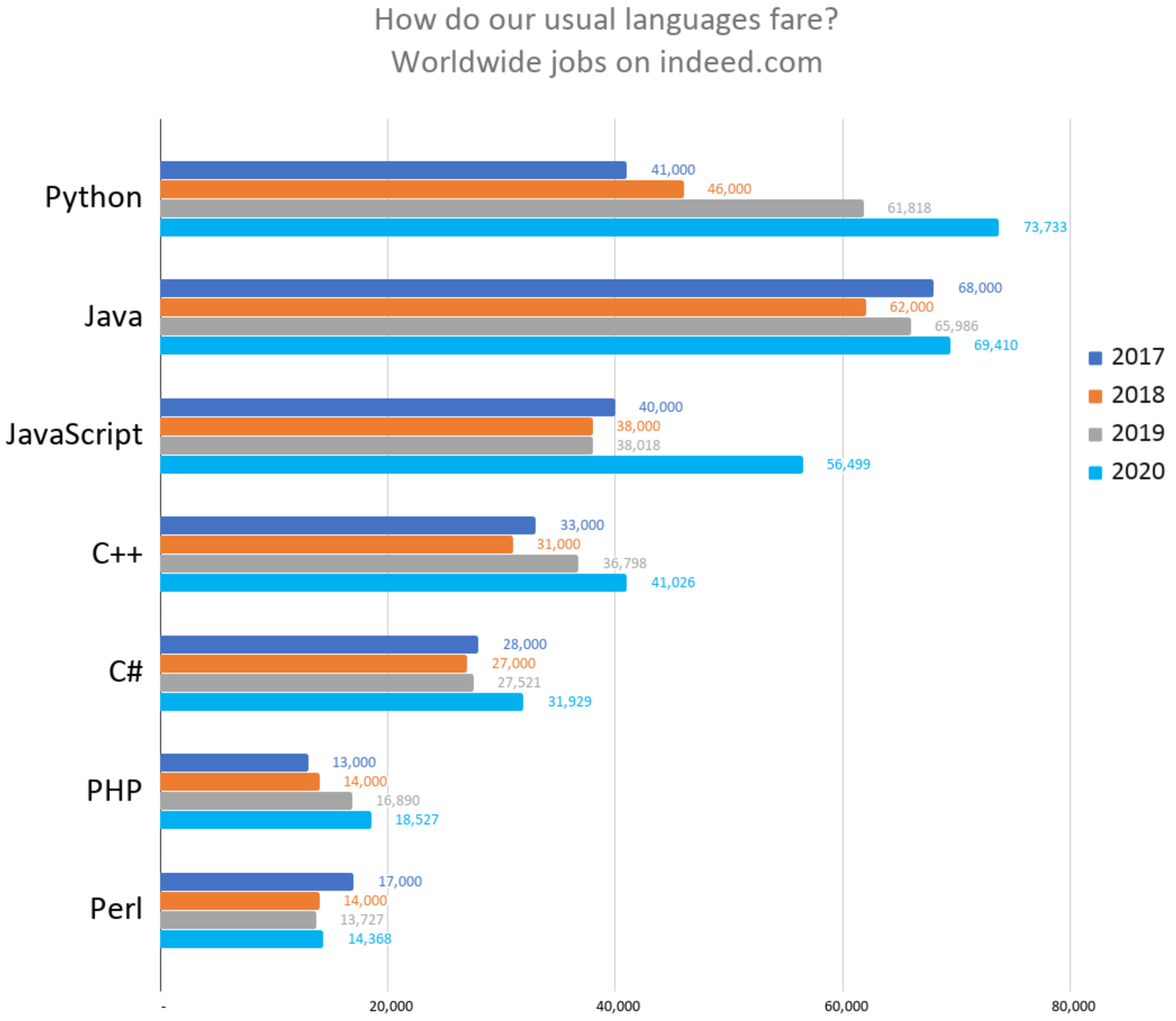
CODE WITH INSTRUCTIONS

COMPILER or

TRANSLATION TO MACHINE CODE

INTERPRETER

MACHINE LANGUAGE


How do our usual languages fare?
Worldwide jobs on indeed.com
Python
41,000
46,000
61,818
73,733
Java
68,000
62,000
65,986
69,410
JavaScript
40,000
38,000
38,018
56,499
C++
33,000
31,000
36,798
41,026
C#
28,000
27,000
27,521
31,929
PHP
13,000
14,000
16,890
18,527
Perl
17,000
14,000
13,727
14,368
2017
2018
2019
2020
-
20,000
40,000
60,000
80,000

# REUSE OF CODE

## LIBRARIES, FRAMEWORKS

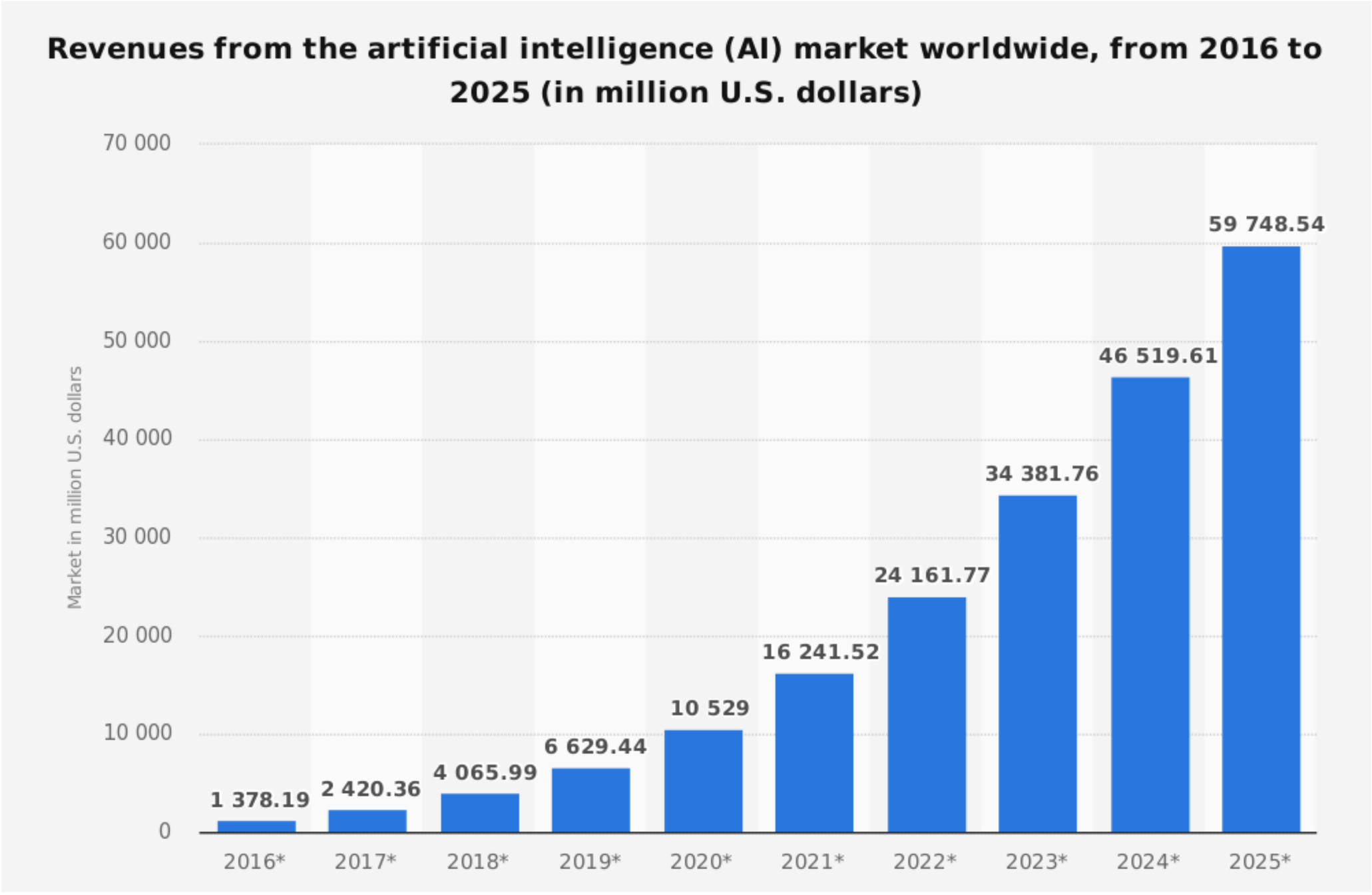


# FAMOUS CODING SITES

- GitHub. GitHub is the world's leading software development platform and also the largest open-source community. ...
- Codecademy. Codecademy is one of the most popular free websites to learn to code. ...
- Treehouse. ...
- Udemy. ...
- Coursera. ...
- Khan Academy. ...
- W3Schools. ...
- EdX.
- …

# 2. PROGRAMMING FOR AI

## A LOOK BEHIND THE SCENES OF THE PROGRAMMER

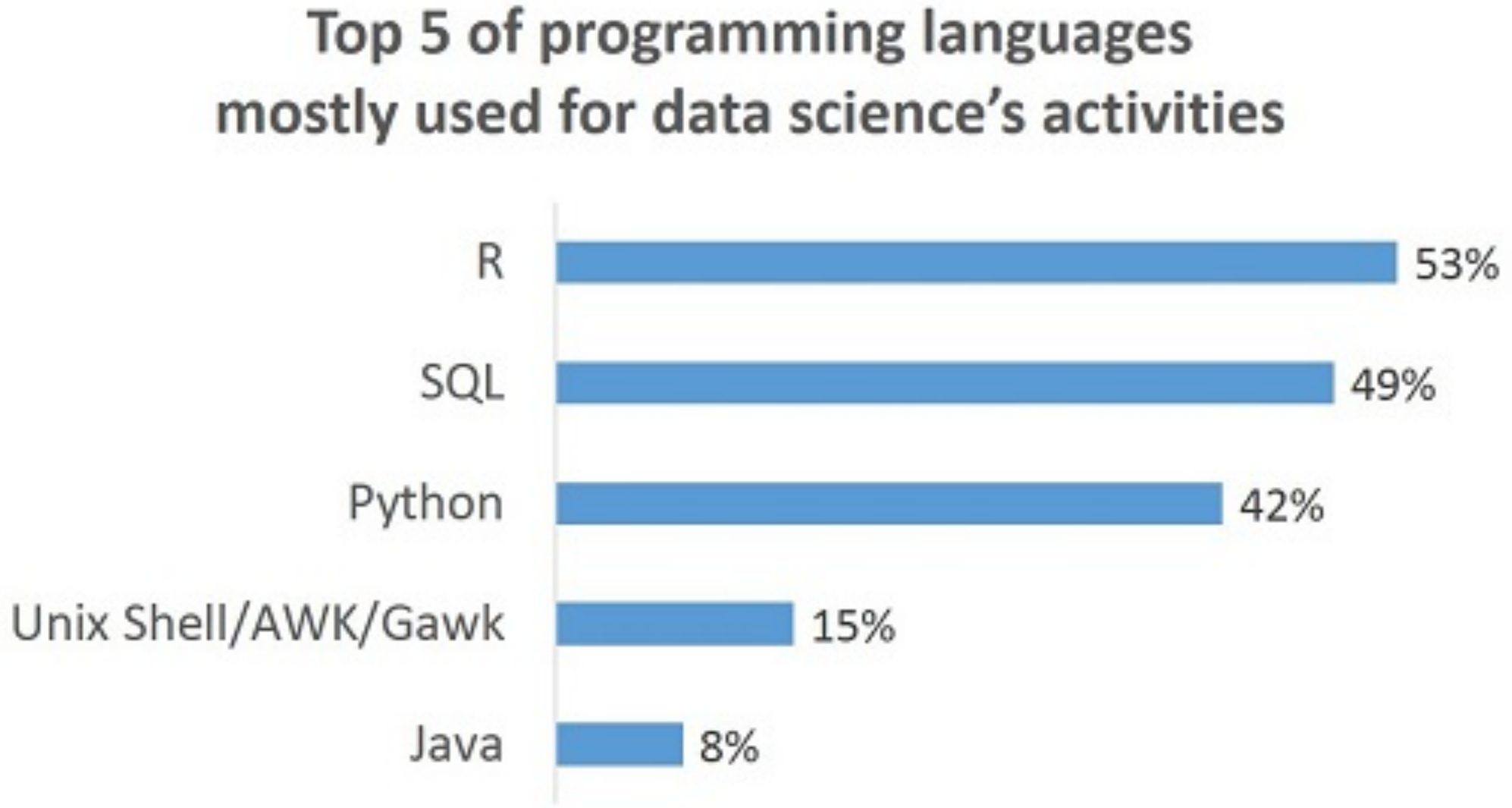

Revenues from the artificial intelligence (AI) market worldwide, from 2016 to 2025 (in million U.S. dollars)
Market in million U.S. dollars
70 000
60 000
50 000
40 000
30 000
20 000
10 000
0
1 378.19
2 420.36
4 065.99
6 629.44
10 529
16 241.52
24 161.77
34 381.76
46 519.61
59 748.54
2016*
2017*
2018*
2019*
2020*
2021*
2022*
2023*
2024*
2025*

Data Flair

# *Programming Languages in AI/ Machine Learning*



- Haskell
- C++
- R Programming
- JavaScript
- Java
- Julia
- Python

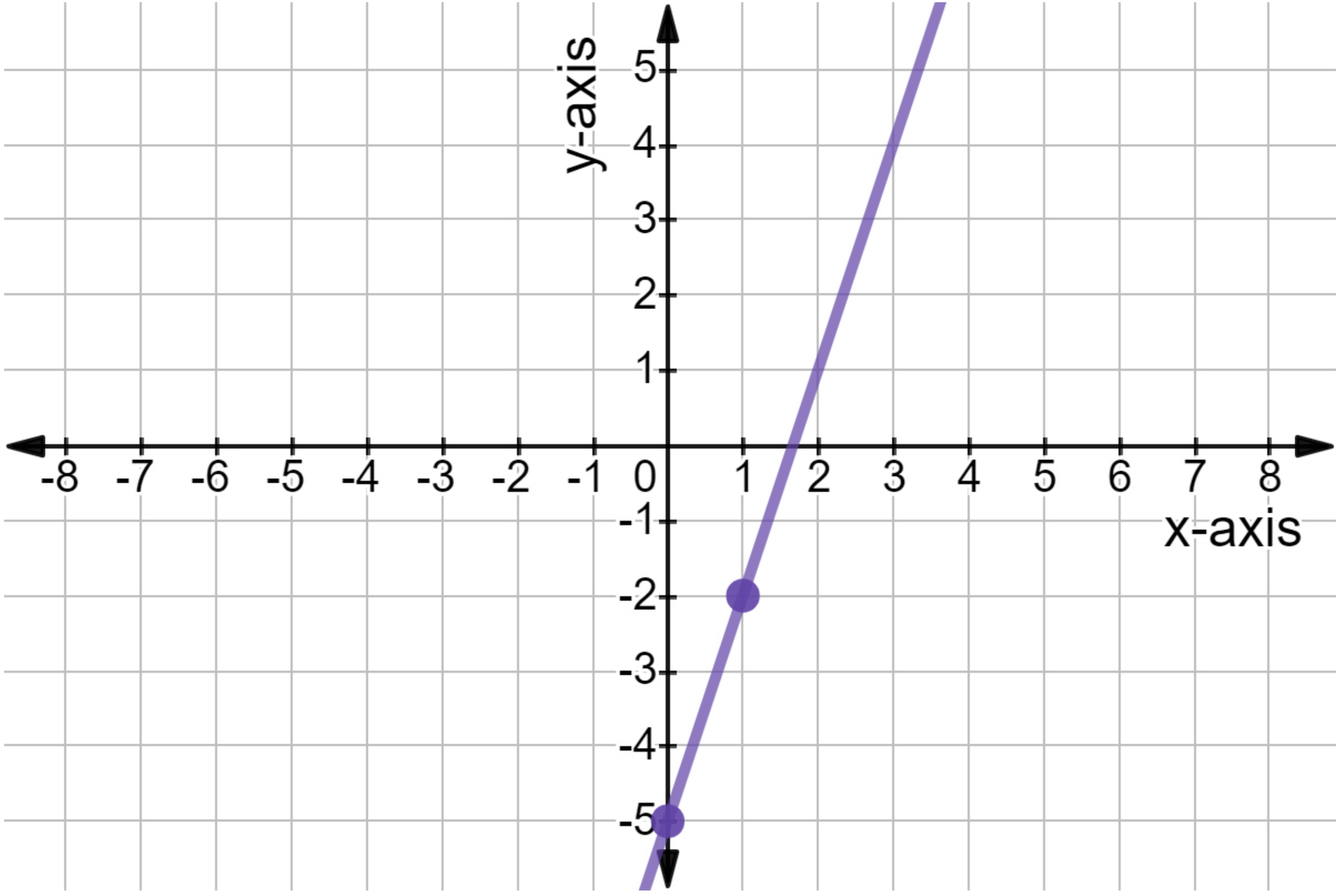

Top 5 of programming languages
mostly used for data science's activities
R
53%
SQL
49%
Python
42%
Unix Shell/AWK/Gawk
15%
Java
8%

# 3. ALGORITHMS FOR AI

## A LOOK BEHIND THE SCENES OF THE PROGRAMMER



**Not all data have linear relationships between variables**


y-axis
x-axis
5
4
3
2
1
-1
-2
-3
-4
-5
-8
-7
-6
-5
-4
-3
-2
-1
0
1
2
3
4
5
6
7
8



You don't always want "yes" (1) or "no" (0) for the answer

# AI as a solution to analysis problems

Essentially, all AI algorithms do the same. They predict an outcome (output) based on unknown input. However, it is the nature of the data that determines the most appropriate algorithm. AI algorithms can be classified based on purpose.

| | Purpose | Learning method | Example |
|---|---|---|---|
| 1 | Classification | Supervised | Spam or no spam |
| 2 | Regression | Supervised | Predicting market value |
| 3 | Clustering | Unsupervised | Uncovering fraudulent transactions |

## 1 Classification algorithms

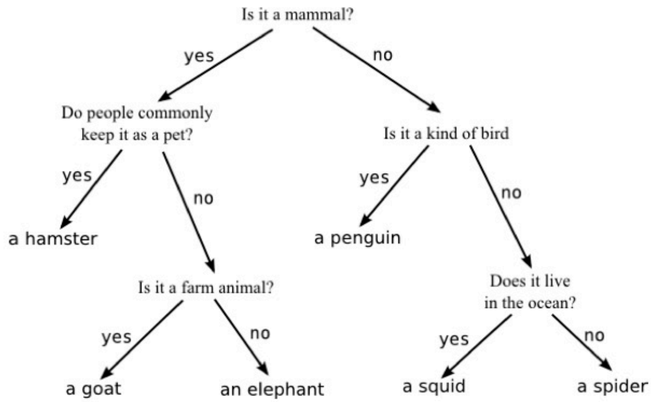
- Naive Bayes
- Decision Tree
- Random Forest
- Logistic Regression
- Support Vector Machines
- K Nearest Neighbours

**Naive Bayes** classifies data by assessing the statistical probability it belongs to a certain class or group. It does not consider correlations, it considers the number of commonalities and arrives at a probability rating based on that. The table below offers an example of sentiment analysis (on the left the dataset, on the right an interpretation)

| TEXT | CATEGORY |
|---|---|
| I am so angry. | mood |
| I feel like superstar. | mood |
| It is going to rain. | not mood |
| I want to cry. | mood |
| They will come together. | not mood |

| | |
|---|---|
| I | mood |
| feel | mood |
| so | |
| terrible | |

A **decision tree** has a structure akin to a family tree. Each branch tests whether a certain condition is met or an attribute possessed thus arriving at an output that determines the next branch. Careful, there is a risk of overfitting when additional input data may lead to radically different output (as with the training data here).

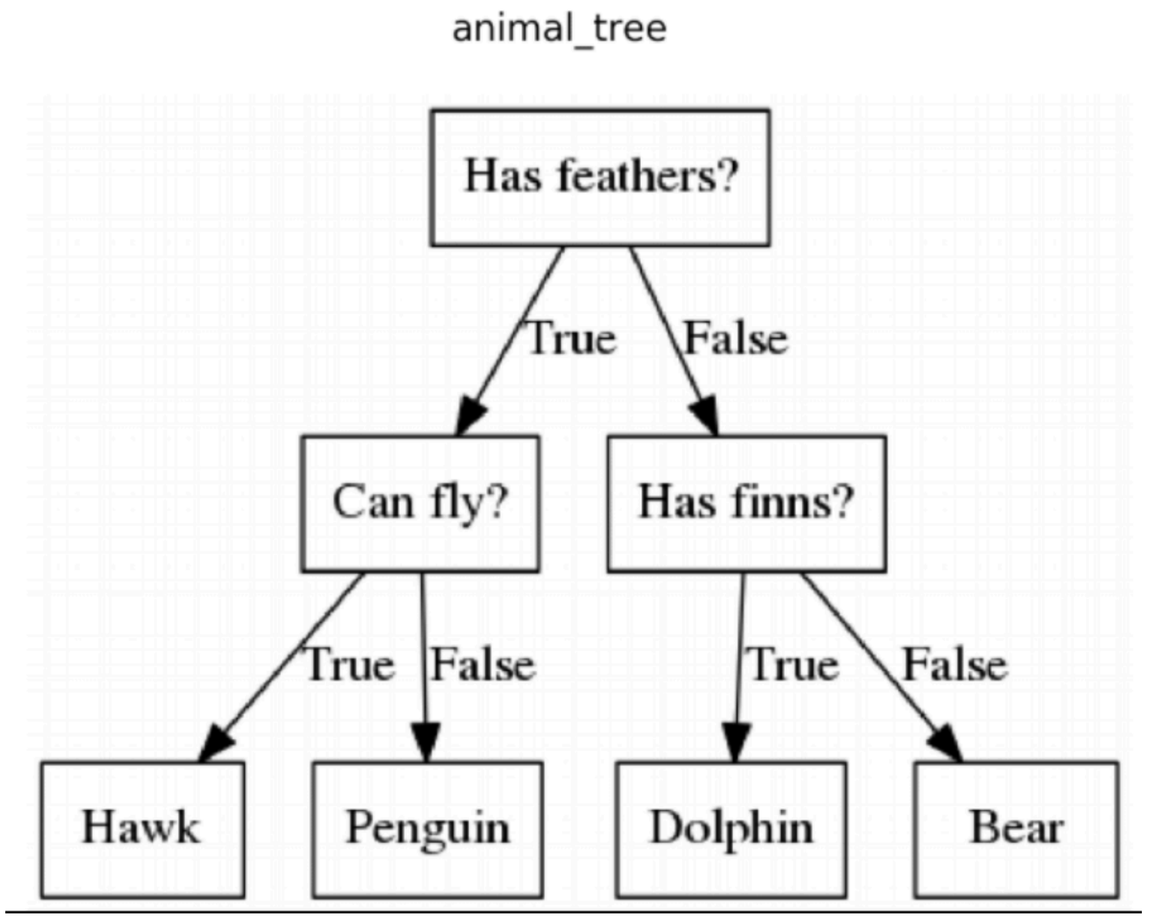


# NAIVE BAYES

https://www.youtube.com/watch?v=CPqOCl0ahss



# DECISION TREES

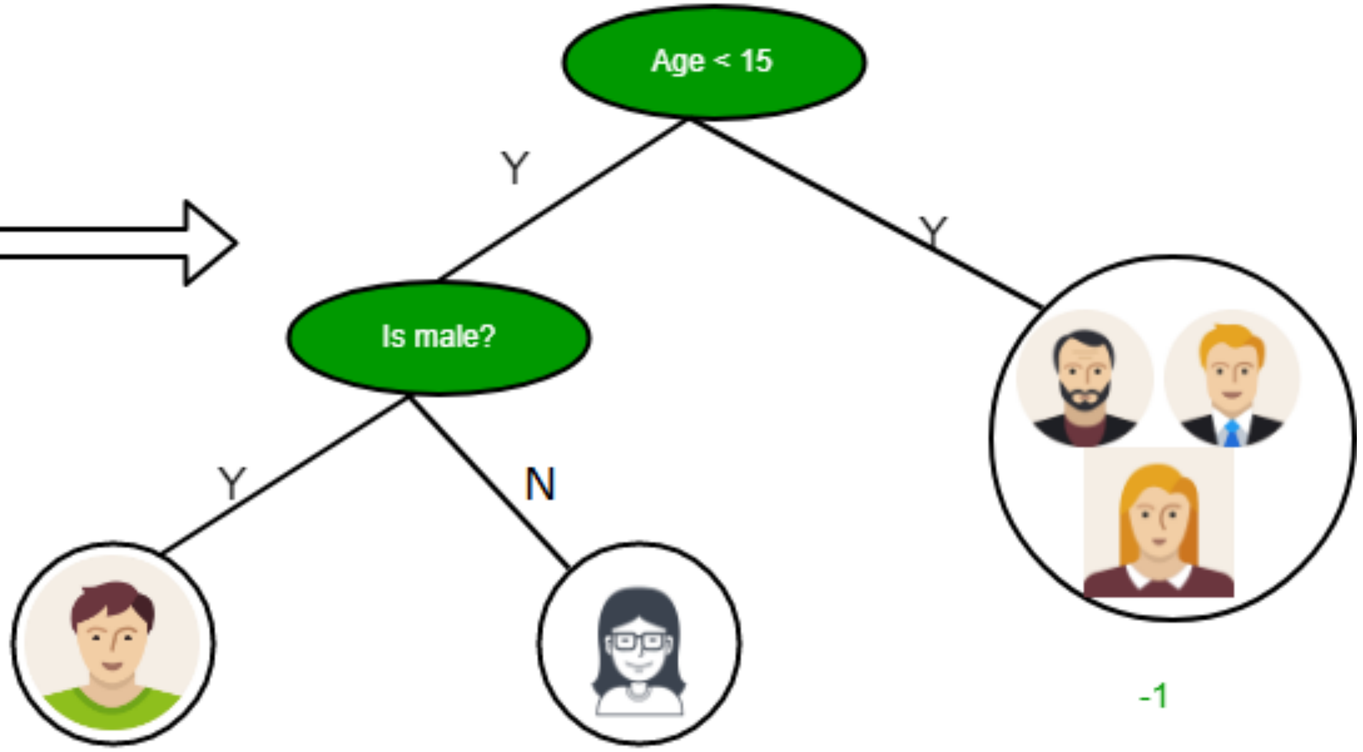


# DECISION TREES

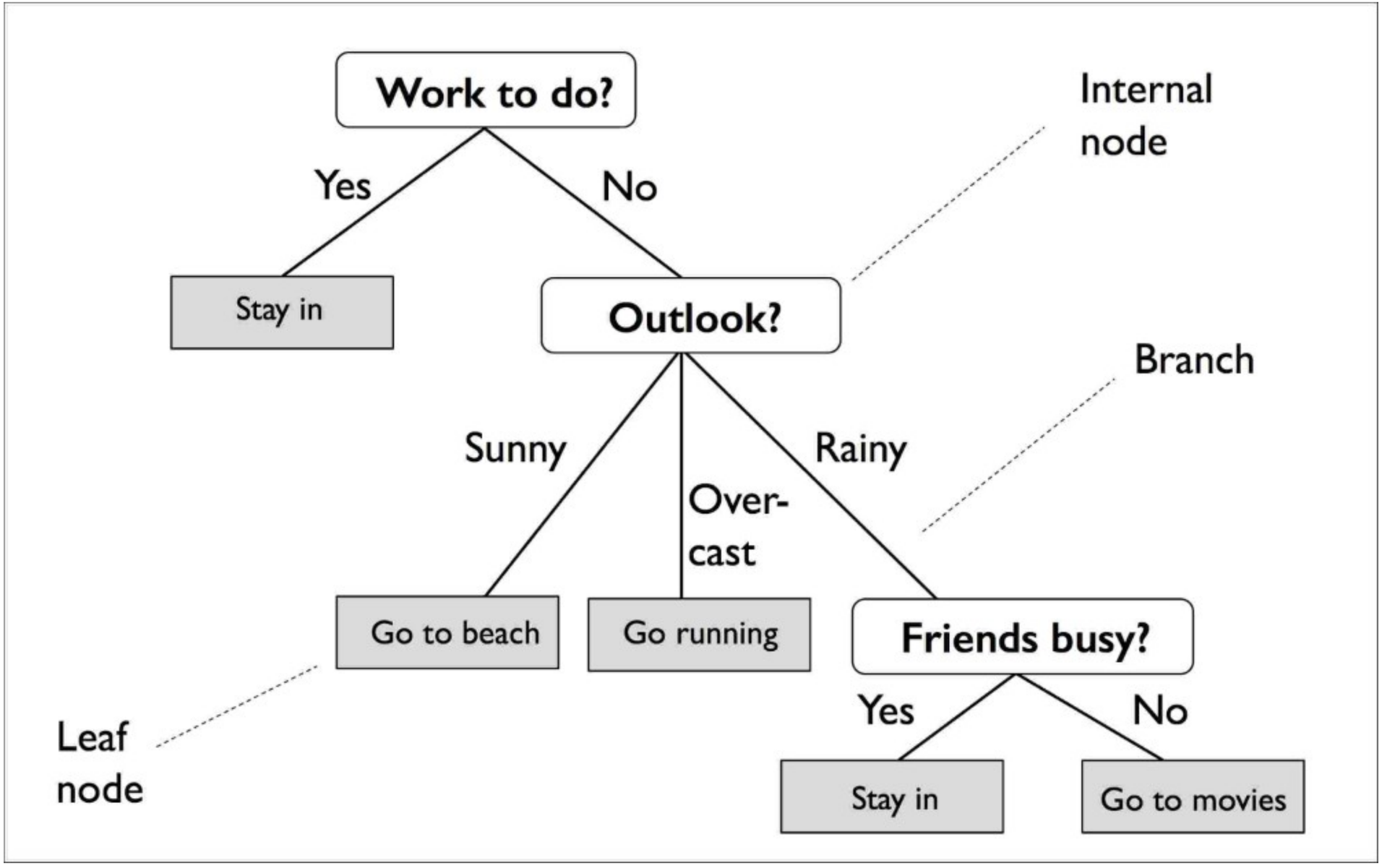
Input: Age, Gender, Occupation, . .



Does the person likes computer games




Prediction score in each leaf ⟶


Work to do?
Yes
No
Stay in
Outlook?
Internal node
Branch
Sunny
Over-cast
Rainy
Go to beach
Go running
Friends busy?
Leaf node
Yes
No
Stay in
Go to movies

A **random forest** is a collection of decision trees in which each decision tree receives a subset of data attributes and provides an output based on this subset. The answer is then the mean of the outputs of all decision trees. This kind of algorithm reduces the overfitting problem and leads to a much more precise classification.

Simply put, **logistic regression** models the probability of what category data falls into based on other information. For instance: Predicting a student's likely final result based on previous results.

A **support vector machine** is a binary classifier, it divides entered data into two classes based on previously selected characteristics. An SVM must be trained with historical data before it is capable of this. The term 'vector' refers to the fact that each datapoint is given an x and a y coordinate in a graph (or vector space). SVMs work well with low-noise small datasets with barely any overlapping categories. They are not suitable for larger datasets.

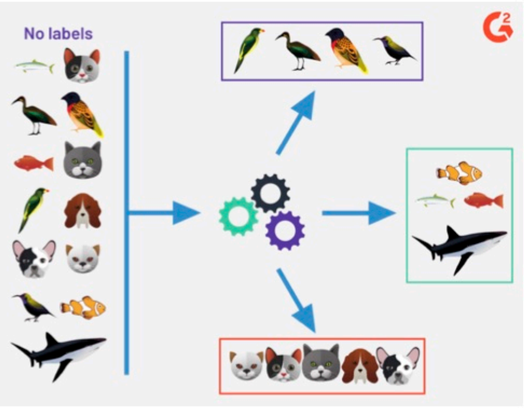
**K-nearest neighbours (k-NN)** starts from the assumption that the class an element belongs to corresponds to the classes of the elements nearest to it. Suppose that everyone in your environment votes green, there is a good chance you do as well. A k value of 5 means you look at the 5 nearest neighbours (in a vector space). When k has a value of 3, you look at the 3 nearest neighbours and so on.

## 2 Regression algorithms

**Linear regression** is the simplest and most effective of regression algorithms. It is used to weigh variables against one another (e.g. the cost of a house and the location of a house). This can be drawn on a graph to arrive at a regression line. House prices can be extrapolated from a linear regression based on location.

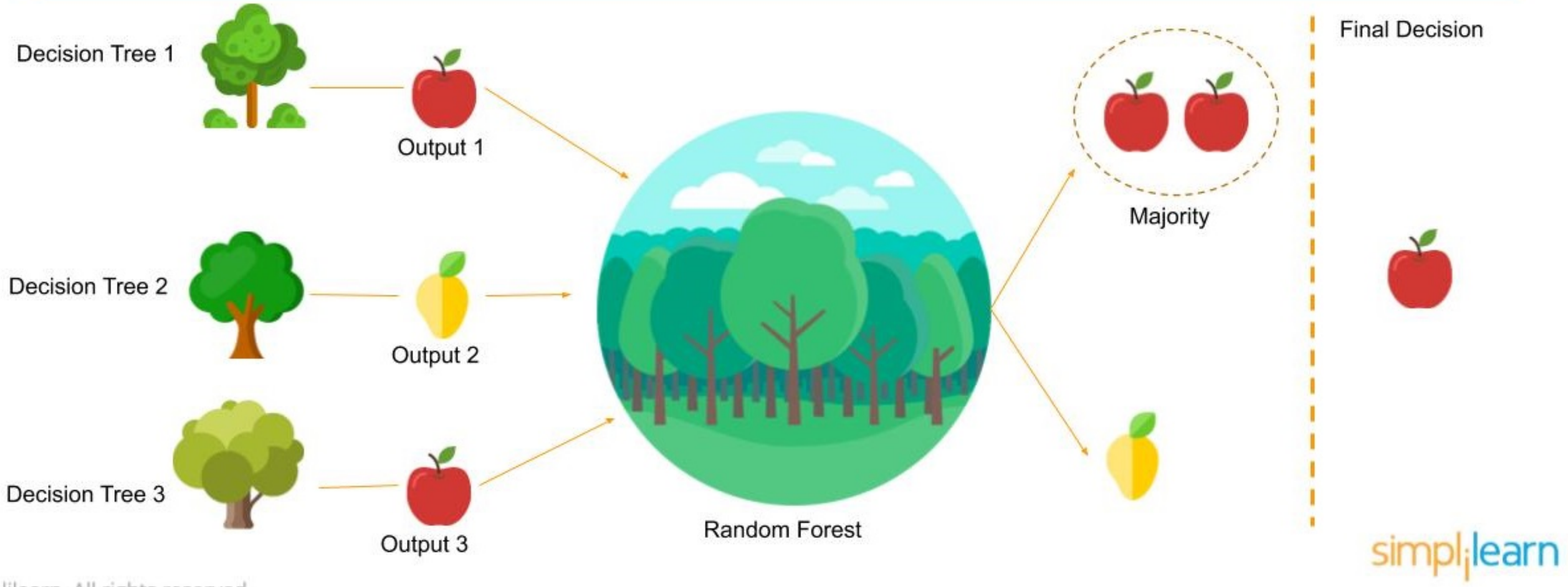
## 3 Clustering algorithms

The above-mentioned **k-means algorithm** divides data into a number of classes to be set by the user (k=1, k=4, etc.). In other words, the user determines the number of classes into which the data must be divided. It is a handy algorithm for datasets that has clearly distinguishable elements (points).



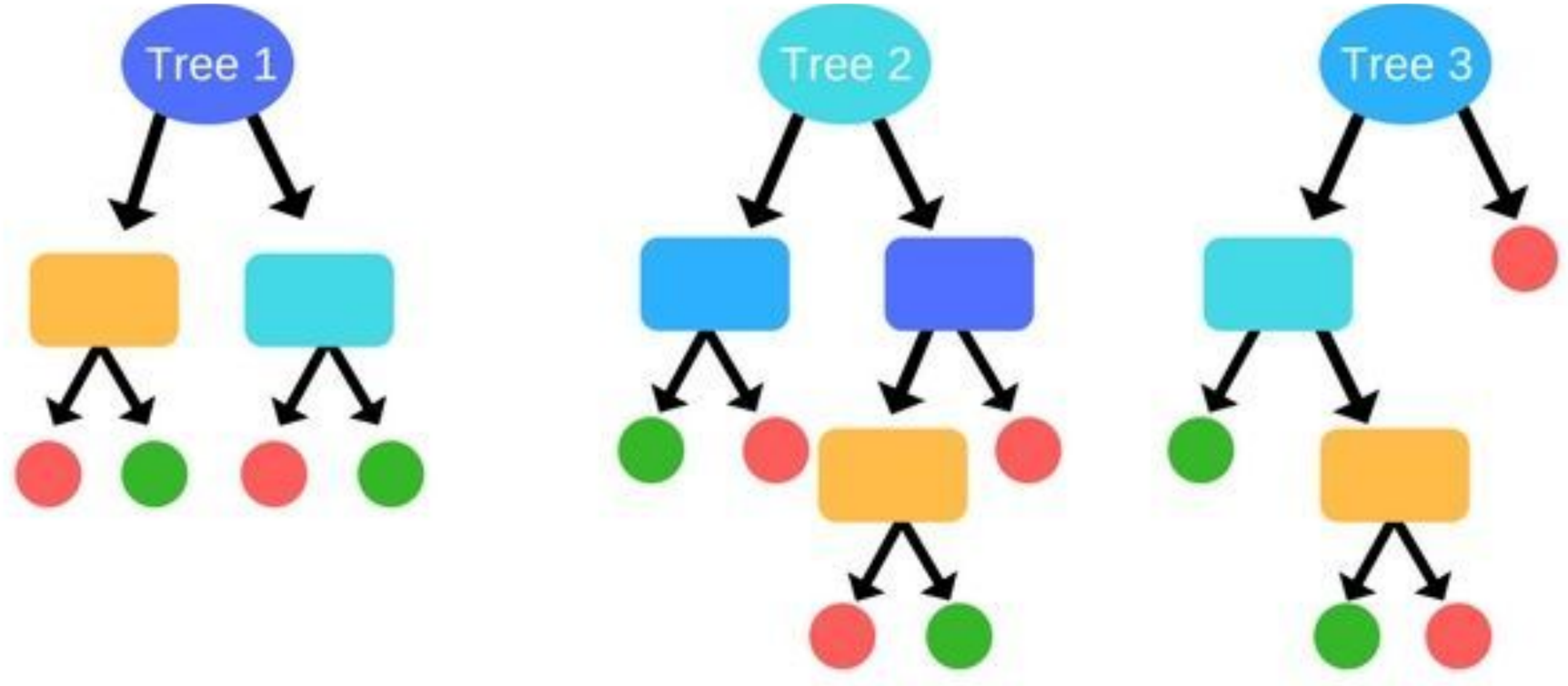
# RANDOM FOREST

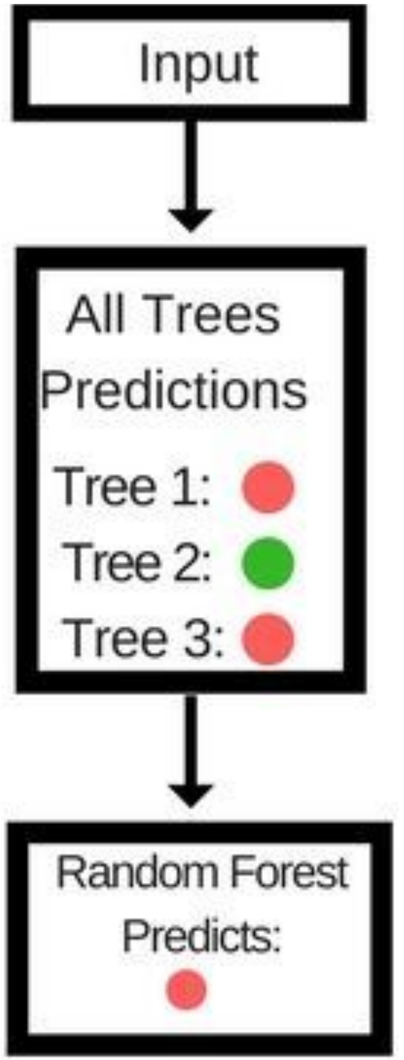
Random forest or Random Decision Forest is a method that operates by constructing multiple Decision Trees during training phase.
The Decision of the majority of the trees is chosen by the random forest as the final decision




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# RANDOM FOREST

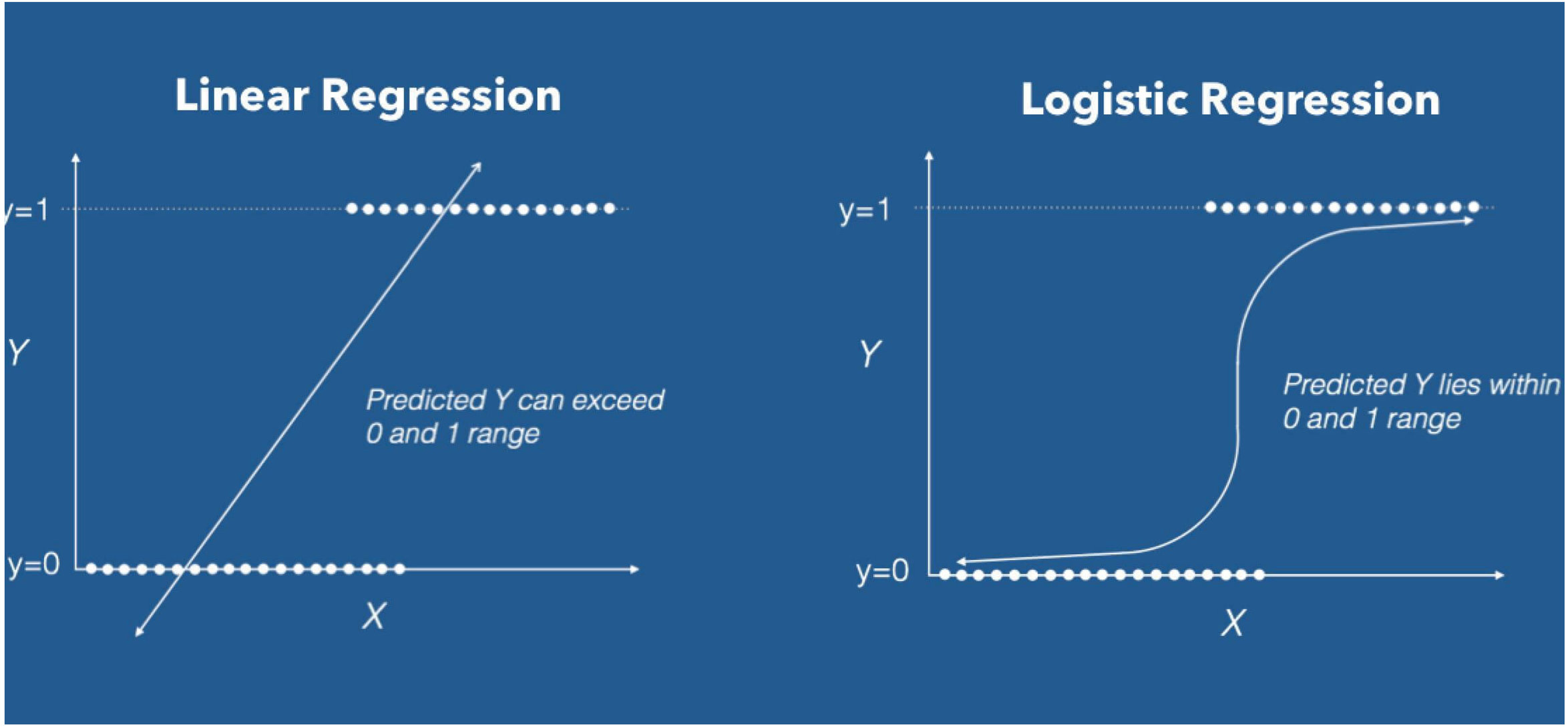


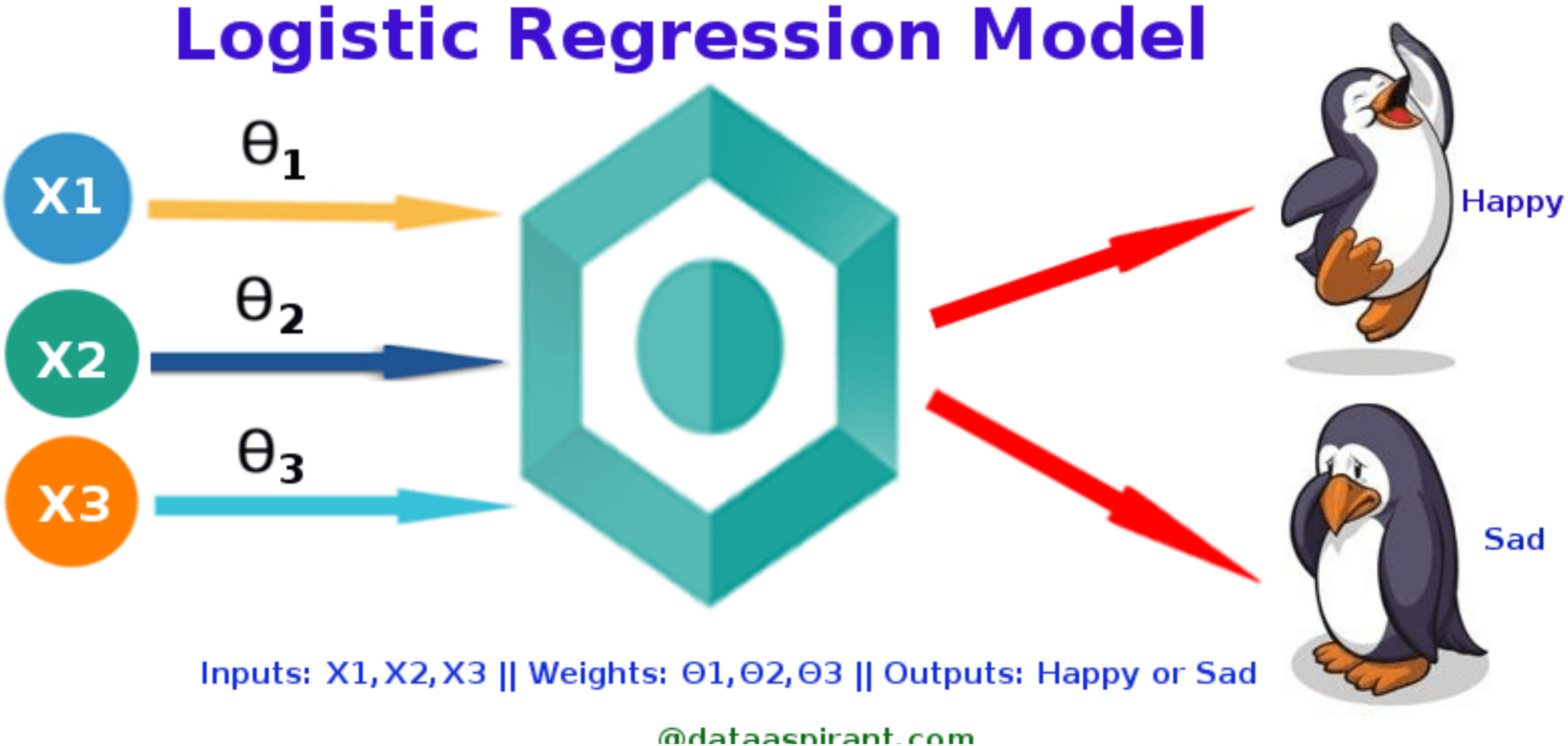

Introduction To Random Forest Algorithm

dataspirant.com

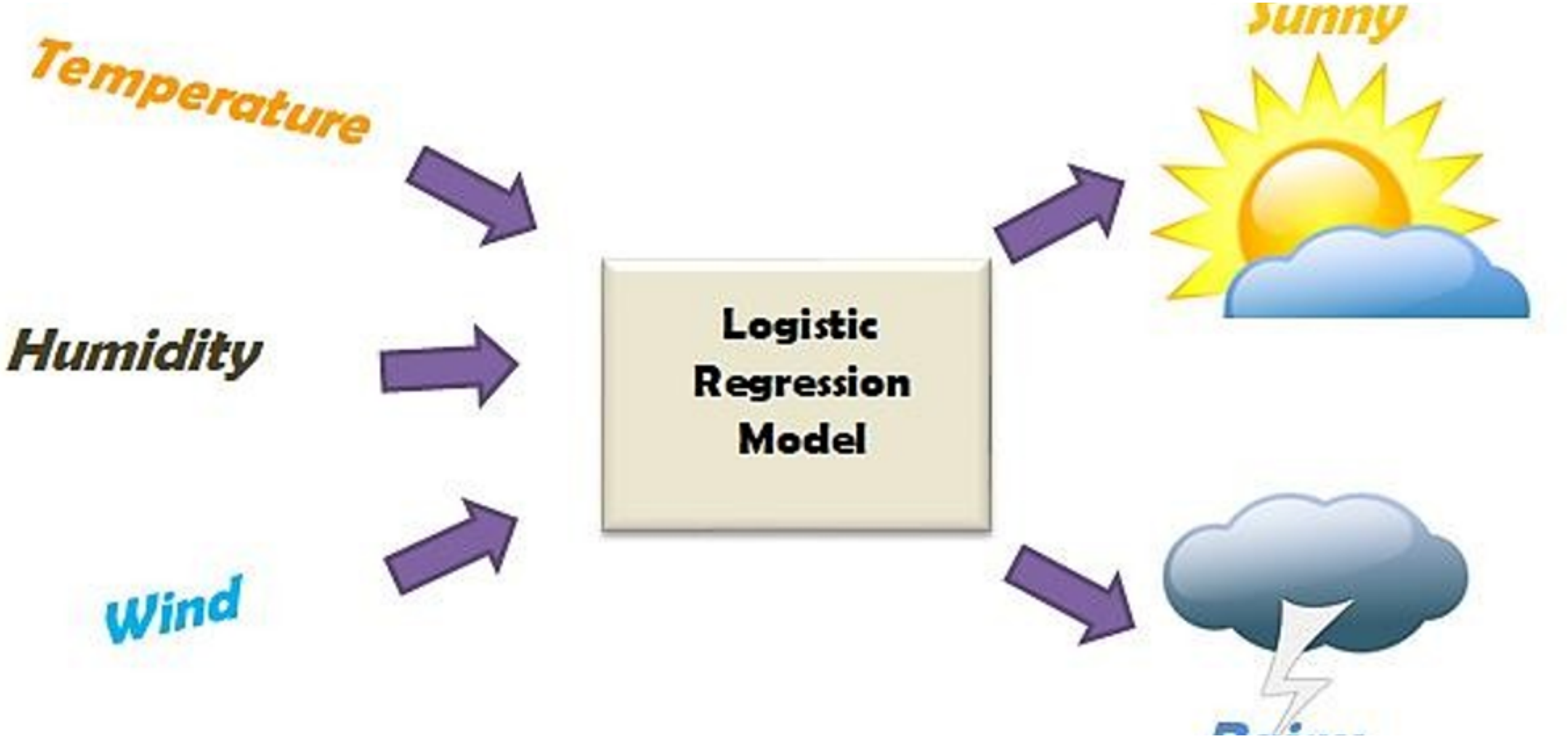
# LOGISTIC REGRESSION



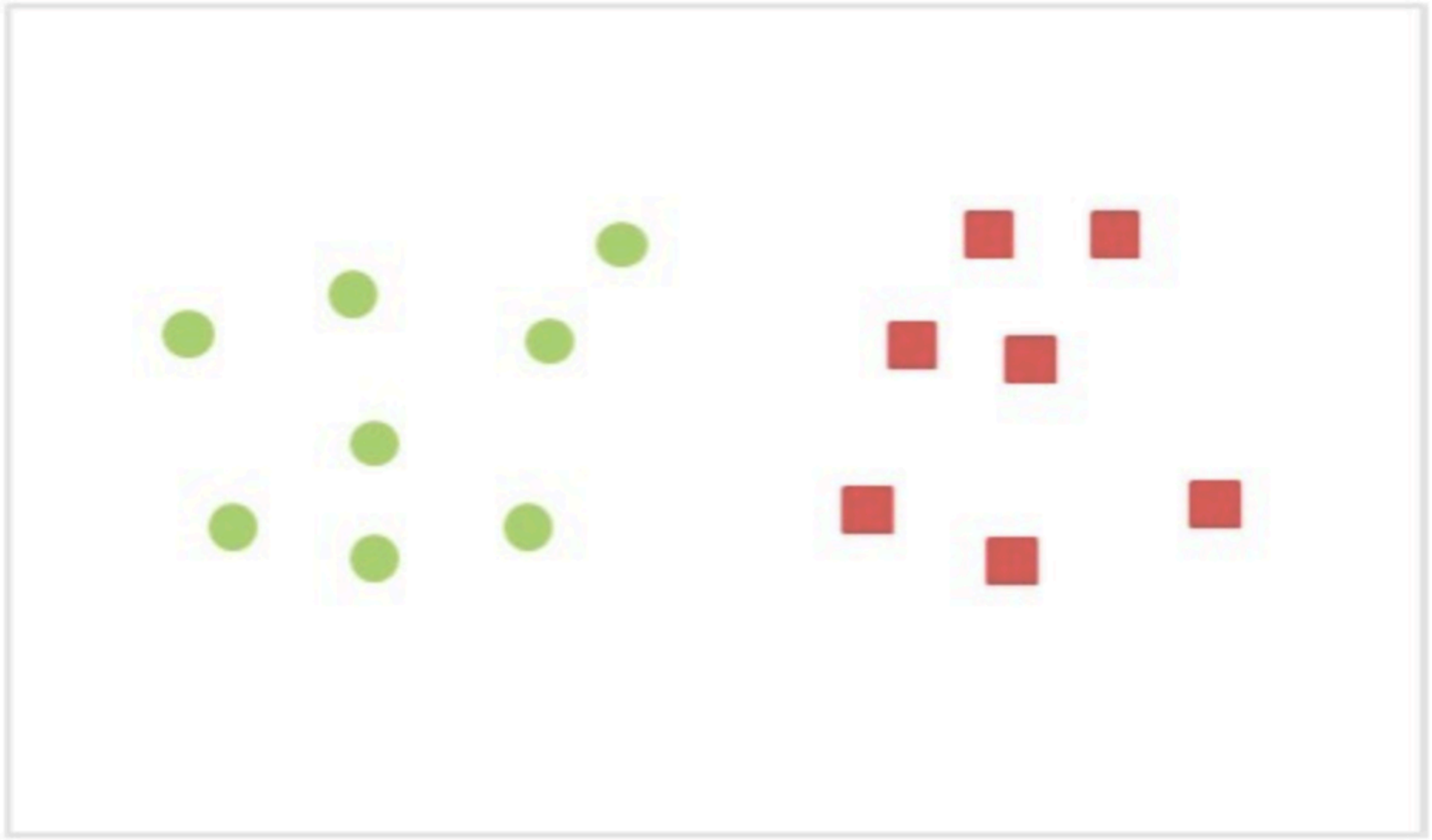
# LOGISTIC REGRESSION



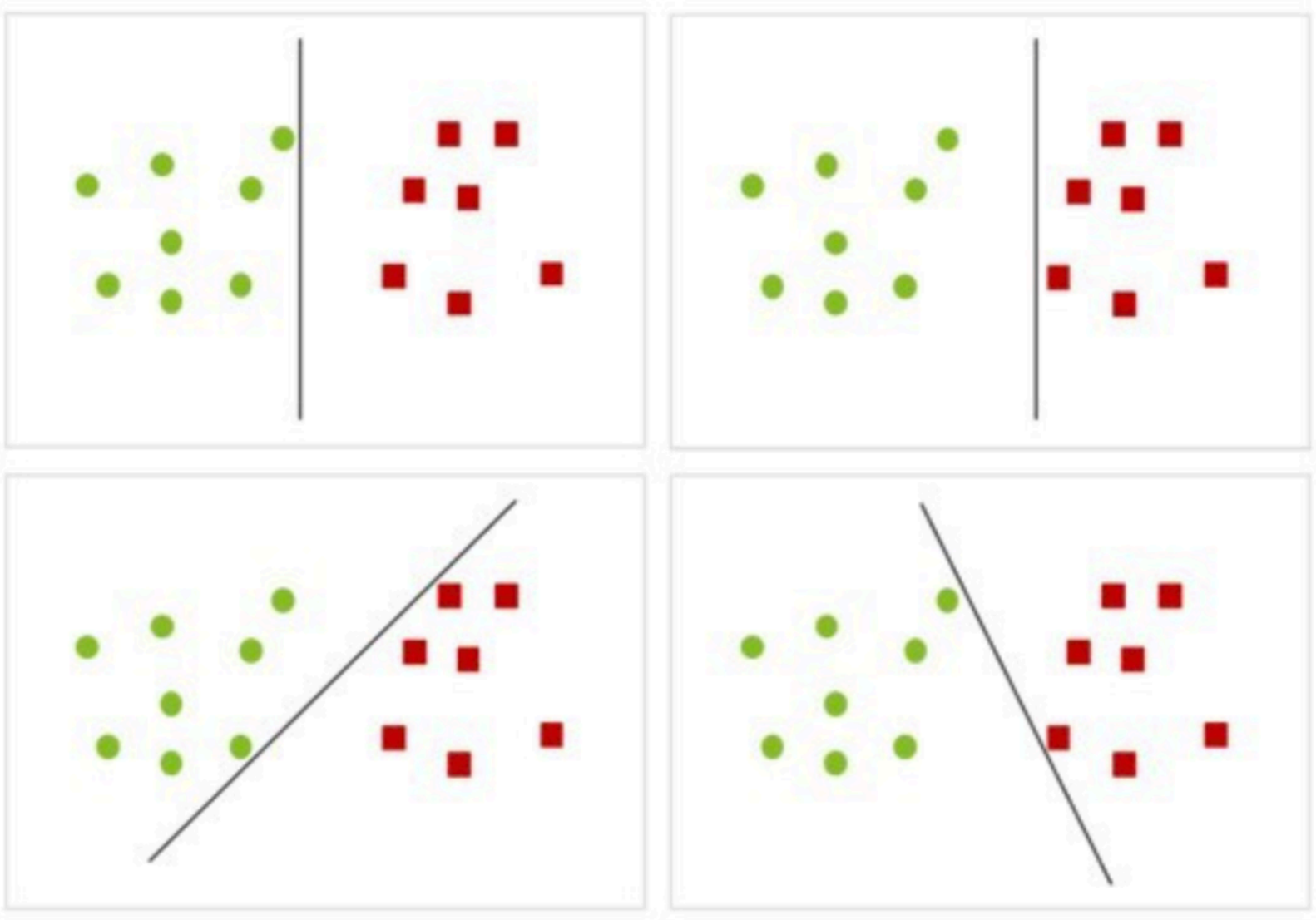
# LOGISTIC REGRESSION



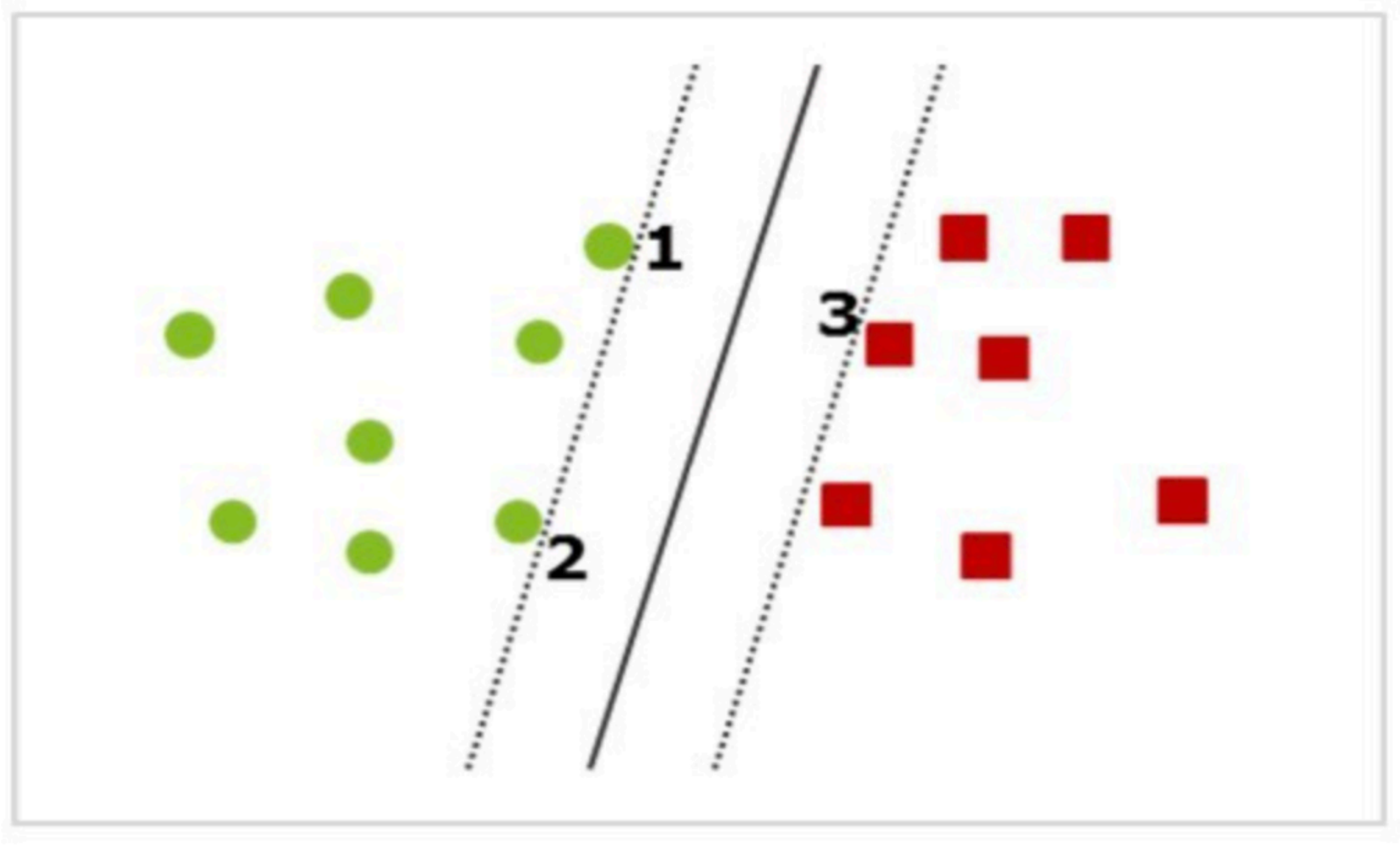
# SUPPORT VECTOR MACHINE (SVM)



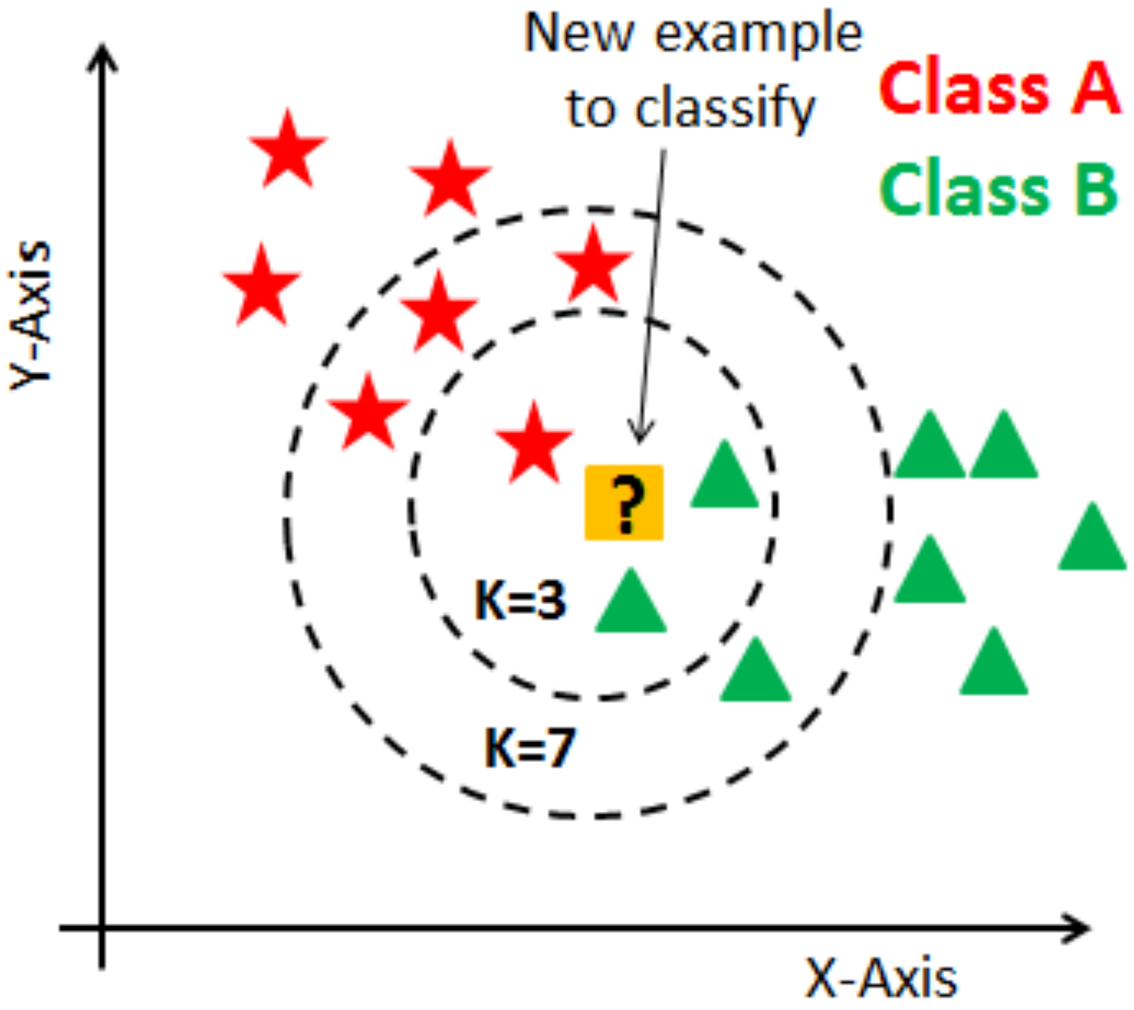
# SUPPORT VECTOR MACHINE (SVM)



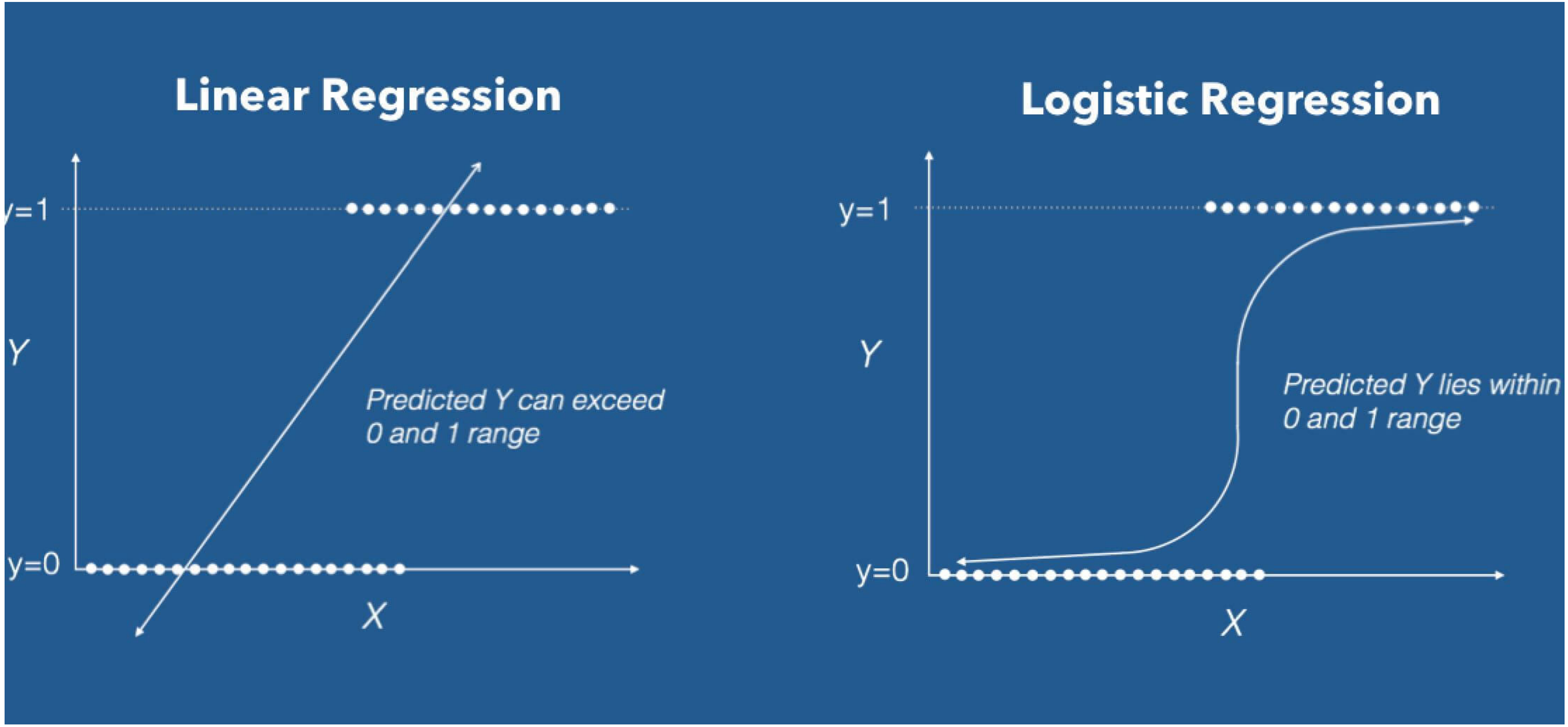
# SUPPORT VECTOR MACHINE (SVM)



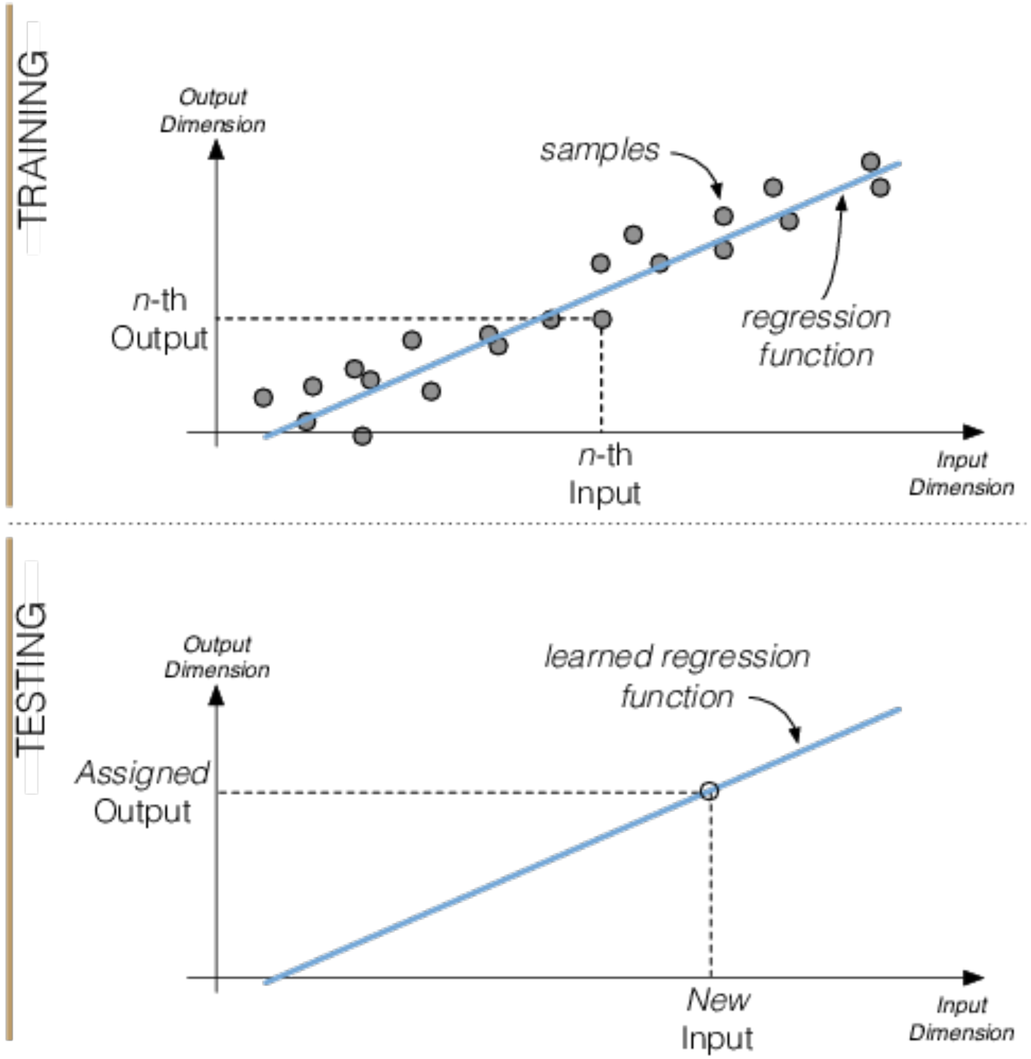
# K-nearest neighbors



# LINEAR REGRESSION



# LINEAR REGRESSION



# CLUSTERING



Pile of dirty clothes

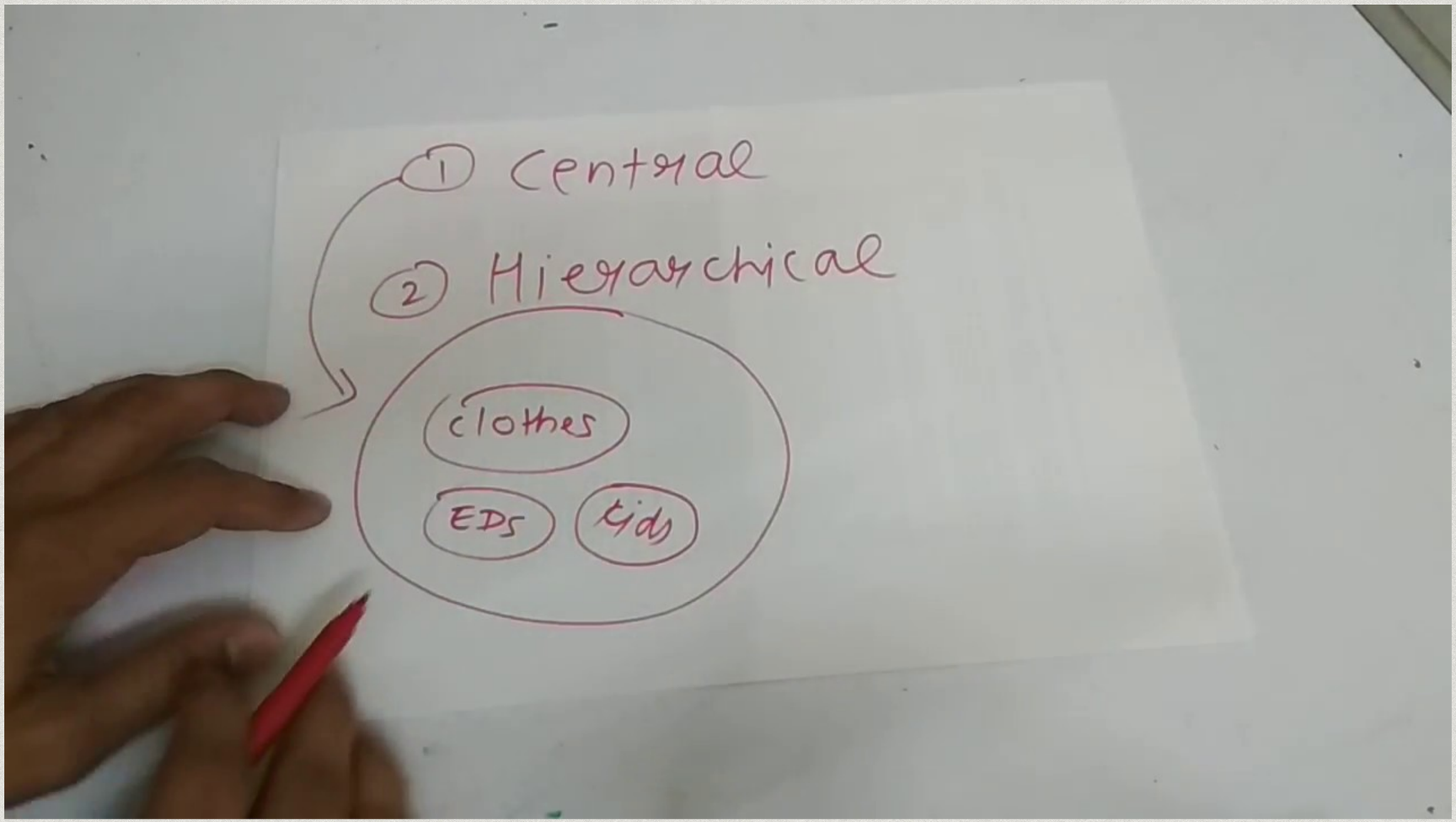
# CLUSTERING



Pile of dirty clothes

# K-means

https://www.youtube.com/watch?v=U4MfJAmDH8s



# 4. ASSIGNMENT

## WILL THE STUDENT PASS OR FAIL?

www.orun.be/ai

```php
<?php
ini_set('display_errors', 1);
ini_set('display_startup_errors', 1);
error_reporting(E_ALL);
require_once("vendor/autoload.php");


use Phpml\Classification\KNearestNeighbors;

$examples = [[1, 4], [2, 9], [3, 5], [2, 10], [5, 9], [3, 5], [0, 2], [4, 16], [3, 16], [5, 15], [5, 20], [4, 20], [5, 19], [3, 20], [3, 15], [2, 14], [3, 11], [2, 13], [4, 15], [4, 8]];
$labels = ['0', '0', '0', '0', '0', '0', '0', '1', '1', '1', '1', '1', '1', '1', '1', '1', '1', '1', '1', '1'];

$CrowlNostradamus = new KNearestNeighbors();
$CrowlNostradamus->train($examples, $labels);

$p1 = $_POST['p1'];
$p2 = $_POST['p2'];

echo $CrowlNostradamus->predict([$p1, $p2]);


?>
```