

---

# No “artificial intelligence” in sight – Only algorithmic processing

François Pellegrini  
Professor, Université de Bordeaux  
francois.pellegrini@u-bordeaux.fr

Ce document est copiable et distribuable librement et gratuitement à la condition expresse que son contenu ne soit modifié en aucune façon, et en particulier que le nom de son auteur et de son institution d'origine continuent à y figurer, de même que le présent texte.

# Algorithms and processing (1)

---

- The term “algorithm” is mainly used in an inappropriate way
  - Victim of a regrettable fashion trend
- An algorithm is the description of a sequence of steps allowing one to obtain some result from a set of elements provided in input
  - Cooking recipes
  - Story plots
  - Mathematical methods

# Algorithms and processing (2)

---

- Confusion between three technically and legally distinct objects:
  - Algorithm
    - Mathematical object of free ride
    - Neither “loyal” nor “ethical”
      - Yet, any scientific project raises ethical issues
  - Software
    - Creation of form expressing one or several algorithms
    - Work of the mind subject to an adapted author right
  - Data processing
    - Carried out by a « data controller/processor »

# “Artificial intelligence”, really?

---

- Term promoted in the 1956 “*Dartmouth College*” conference
  - “strong AI”: generalist synthetic intelligence
  - “weak AI”: assistance to specialized tasks
- To date, only “weak AIs” are implemented
  - Far away from the “singularity” !
- “AI” is a political buzzword rather than a scientific concept
  - It allows scientists to get grants!

# “Code is law”

---

- Software and their underlying algorithms, like any artifact, derive from their social, economic and cultural environment
  - Incorporate human biases by nature
- “Model” is a synonym for “prejudice”
  - It is the designer's choice to keep what is “important” and discard what is not
- “Code is law”
  - Humans (and machines) can only perform what has been specified in the software

# Deduction vs. induction

---

- Two ways to obtain a result from a machine (works for human beings as well):
  - Deductive algorithms:
    - The model is already known
    - Results are obtained by deduction from the inputs
  - Inductive algorithms
    - The model is not provided *a priori*
    - The goal is not to model, but to evidence correlations within sets of data
    - Impossibility to obtain certitudes

# “Self-trained” processing (1)

---

- The purpose of self-trained processing is to emulate Pavlovian conditioning
  - Reinforce correlations between a set of (supposedly) relevant inputs and desired outputs
- The system is modeled as a black box in which outputs are computed from inputs by way of mathematical functions whose coefficients can be tuned so as to increase correlation
  - Improperly called “training”

# “Self-trained” processing (2)

---

- “Deep learning” means that the system comprises many layers of such mathematical operators
- Allows for the extraction of ever more “abstract”/ “high level” features from the set of input data
  - Up to “capture” the stylistic features of a painting to transpose them into another support image



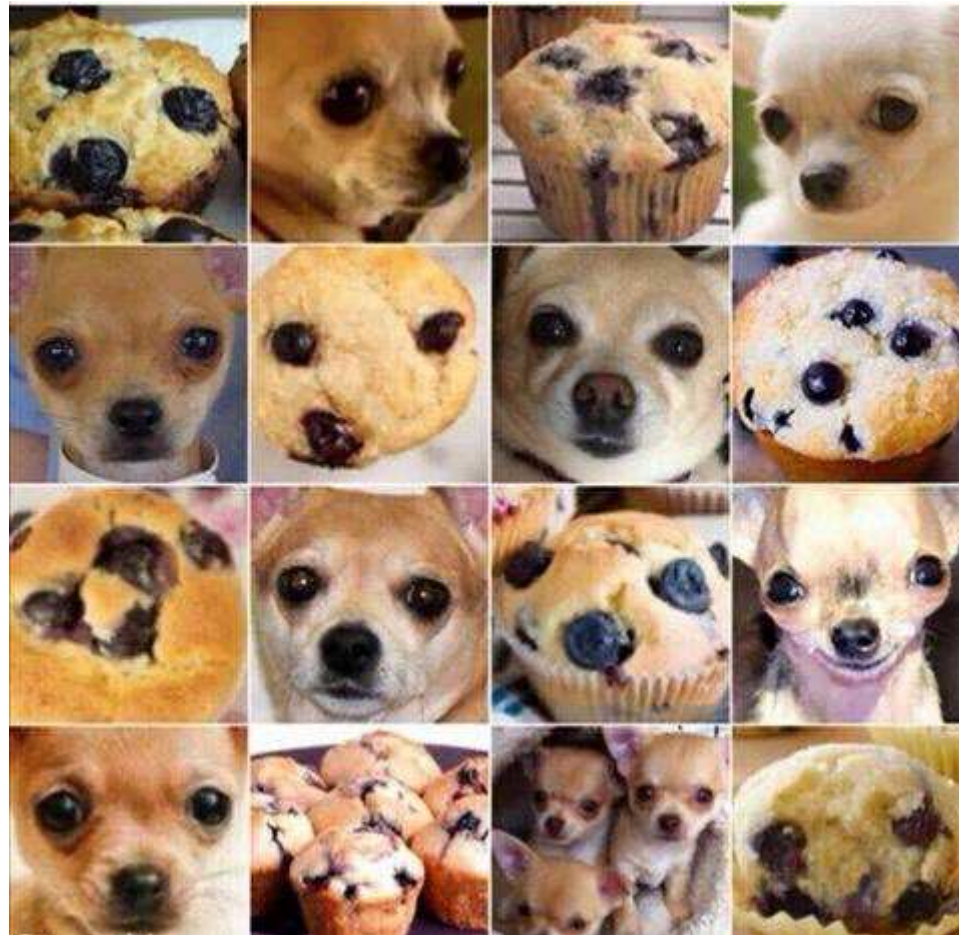
# “Self-trained” processing (3)

---

- Many levels of biases
  - Filtering during the collection of data sets
    - “Mr” vs. “Mrs” in forms
  - Selection of training data sets
    - “All Percivals are serial killers”
  - Convergence of the mathematical operator
    - There is no way to prevent convergence from focusing on insignificant features
- Issue of replay
  - Ex post evidence of a bias?

# Really “intelligent” ? (1)

- Are chihuahuas muffins?



# Really “intelligent” ? (2)

- How different are pandas from gibbons?

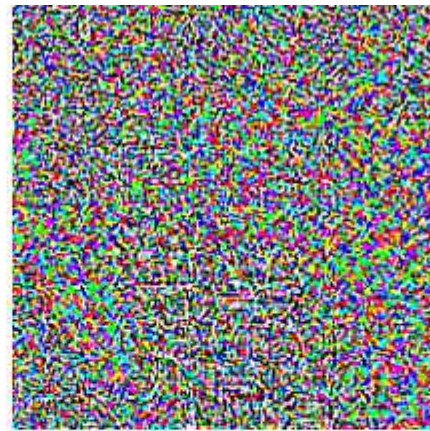


$x$

“panda”

57.7% confidence

+ .007 ×



$\text{sign}(\nabla_x J(\theta, x, y))$

“nematode”

8.2% confidence

=



$x +$

$\epsilon \text{sign}(\nabla_x J(\theta, x, y))$

“gibbon”

99.3 % confidence

Source: Ian J. Goodfellow et al., Google Inc.

# Really “intelligent” ? (3)

- How different are rifles from helicopters?



Source : Andrew Ilyas  
& al., MIT

# Conclusion

---

- Inductive data processing is useful to identify patterns inside masses of data
  - Yet, it cannot sort out spurious correlation from causality
- Machines are NOT intelligent
- Machines are NOT creative
- They only do what they can do: compute according to the specifications of their software
  - Neither originality nor authorship on data transformed in an automated way