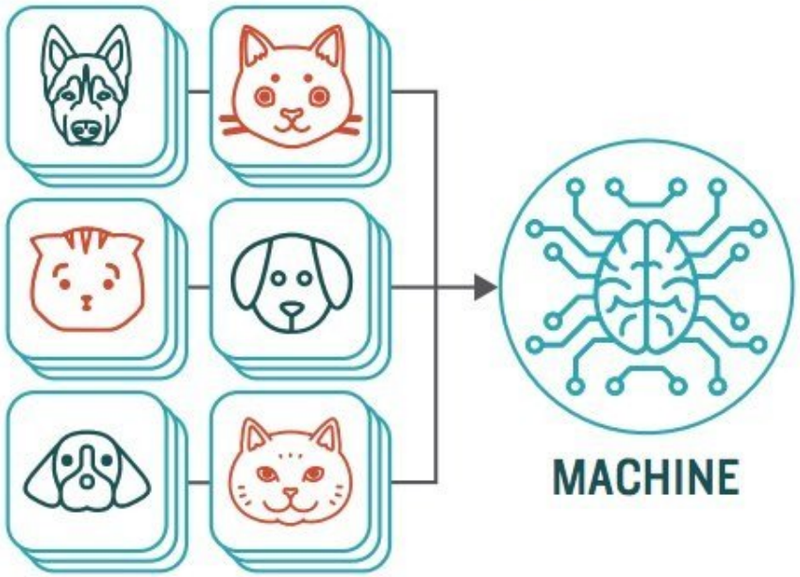
LOGISTIC

REGRESSION

How **Unsupervised** Machine Learning Works

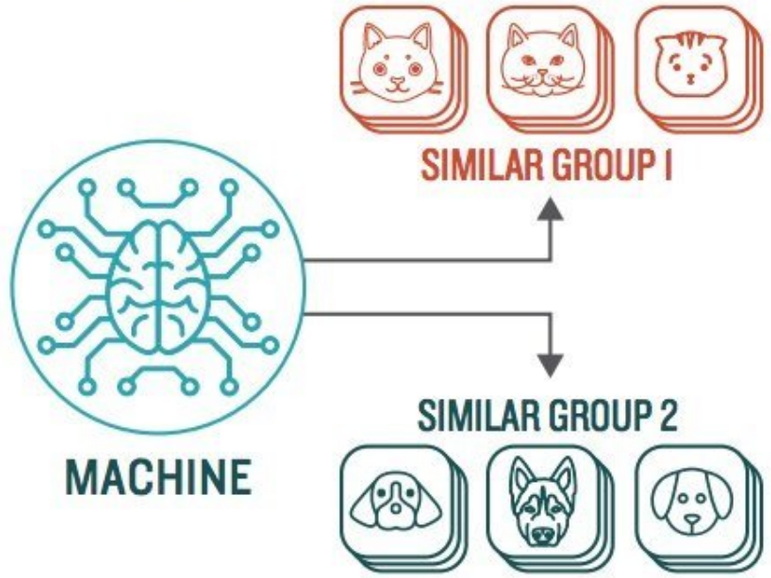
STEP 1

Provide the machine learning algorithm uncategorized, unlabeled input data to see what patterns it finds

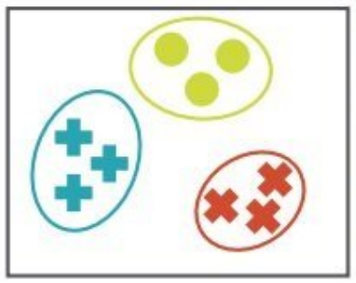


STEP 2

Observe and learn from the patterns the machine identifies



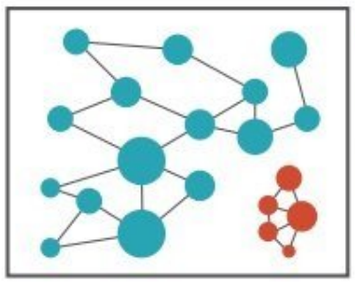
TYPES OF PROBLEMS TO WHICH IT'S SUITED



CLUSTERING

Identifying similarities in groups

For Example: Are there patterns in the data to indicate certain patients will respond better to this treatment than others?

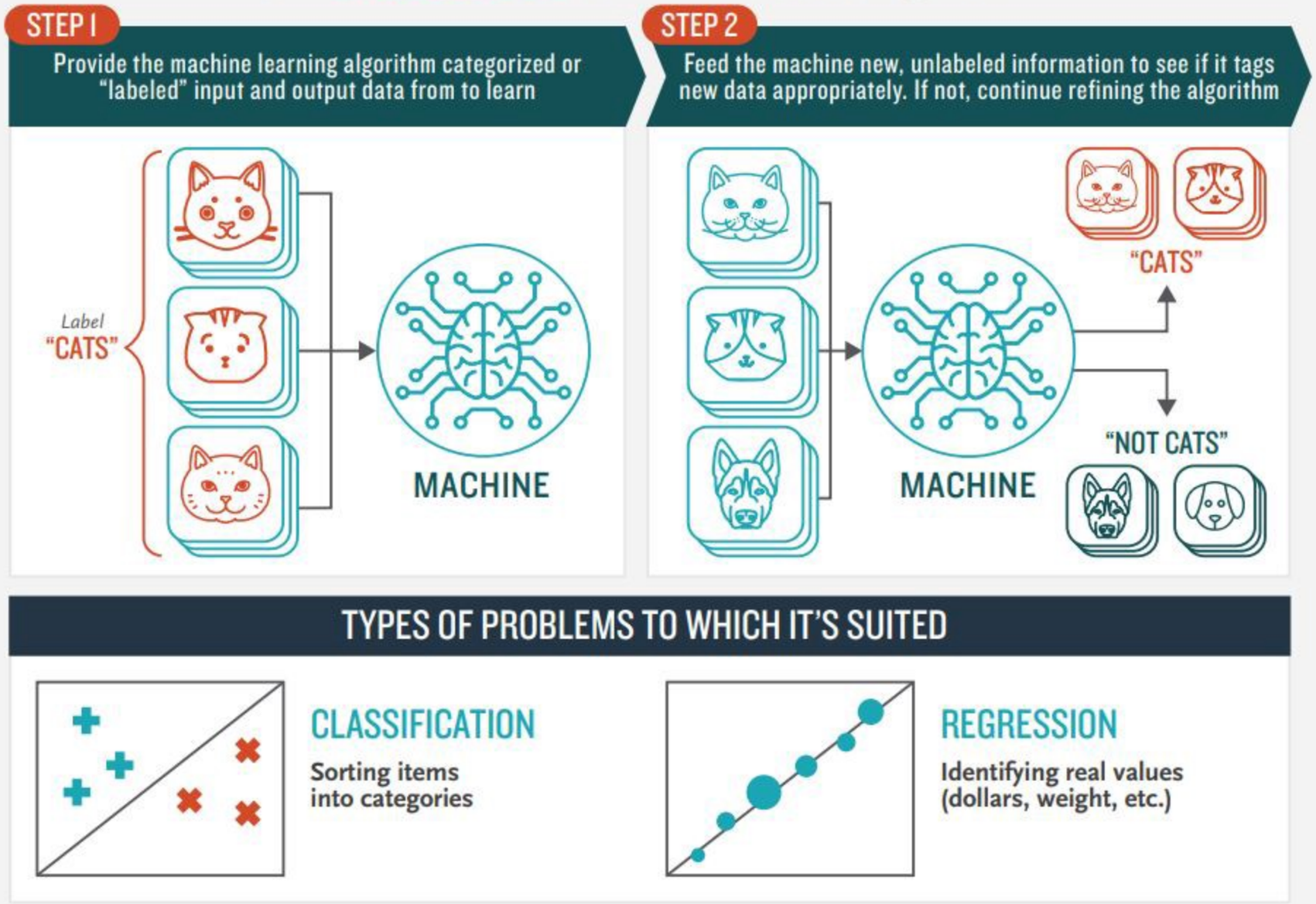


ANOMALY DETECTION

Identifying abnormalities in data

For Example: Is a hacker intruding in our network?

No labels attached to data



Labels attached to data

ANALYTICS MODELS

- Decision trees
- Regression trees
- Random forests
- Boosted trees
- **Logistic regression**
- Naïve Bayes
- K-Means Clustering

- **Logistic Regression** is similar linear regression, yet its used when outcome variable is categorical.

- **Example:**
  - **Input X:** GRE score, GPA and undergrad school rank
  - **Output Y:** Admission (Yes/No) Binary classification Y=0 or Y=1

- We are more interested in estimating the **probabilities** that X belongs to each category in C. For example, we will estimate the **probability if a student will get admission,** than a classification he will be accepted or not.

- In case of a binary outcome, linear regression does a good job as a classifier. However, linear regression might produce probabilities less than zero or bigger than one. **Logistic regression is more appropriate.**

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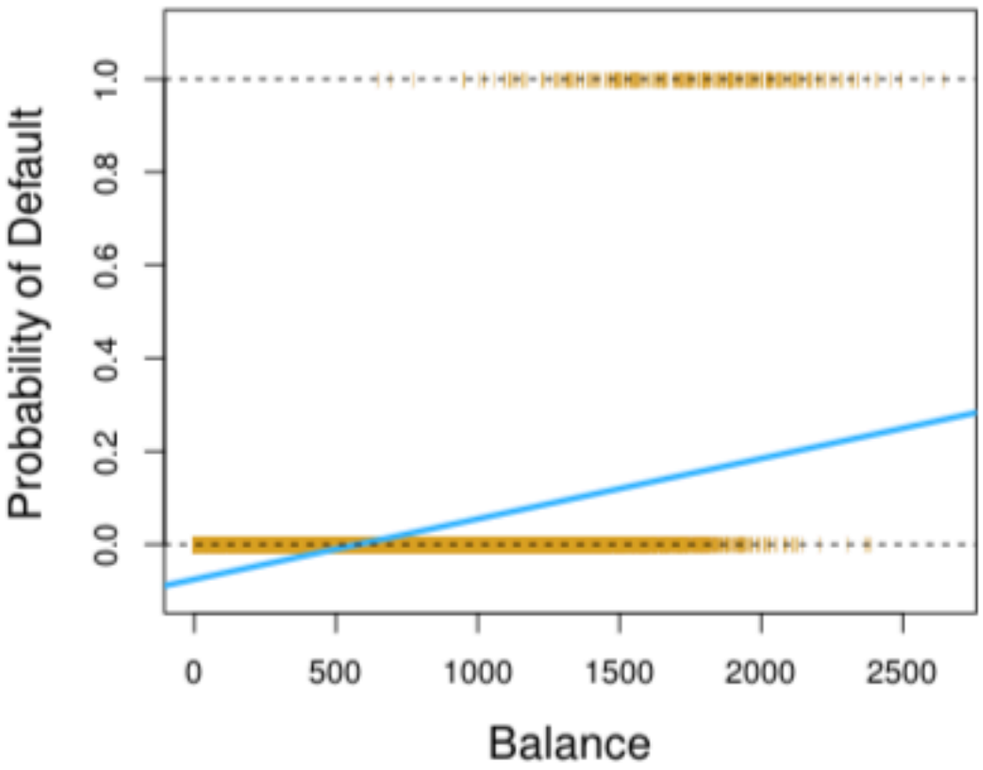
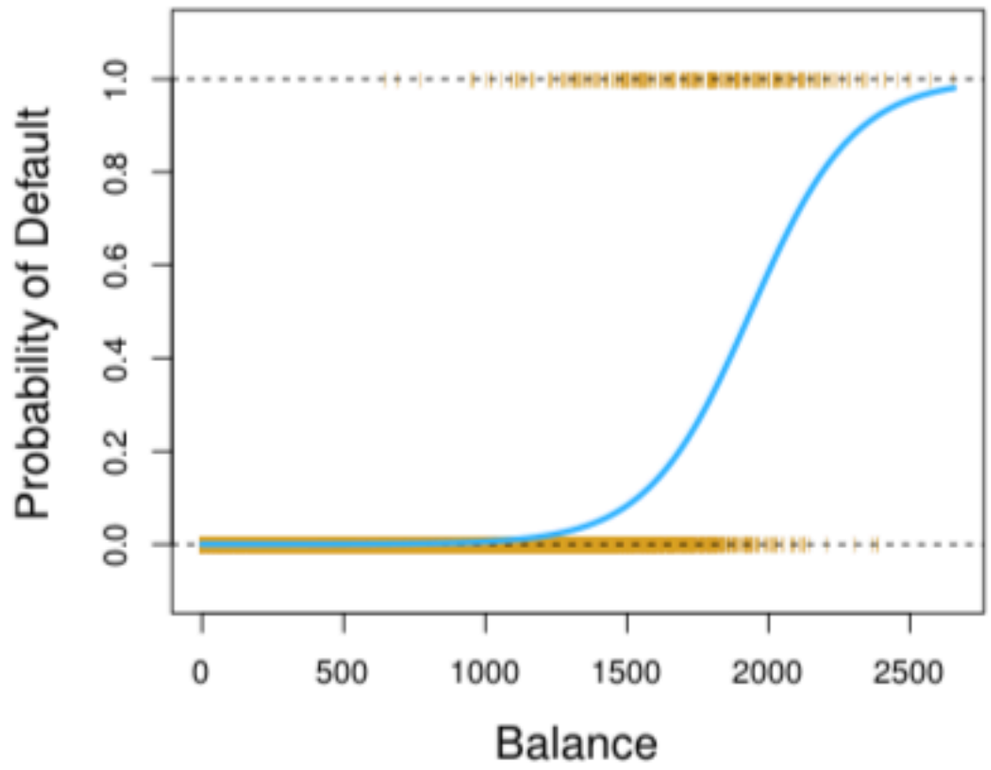
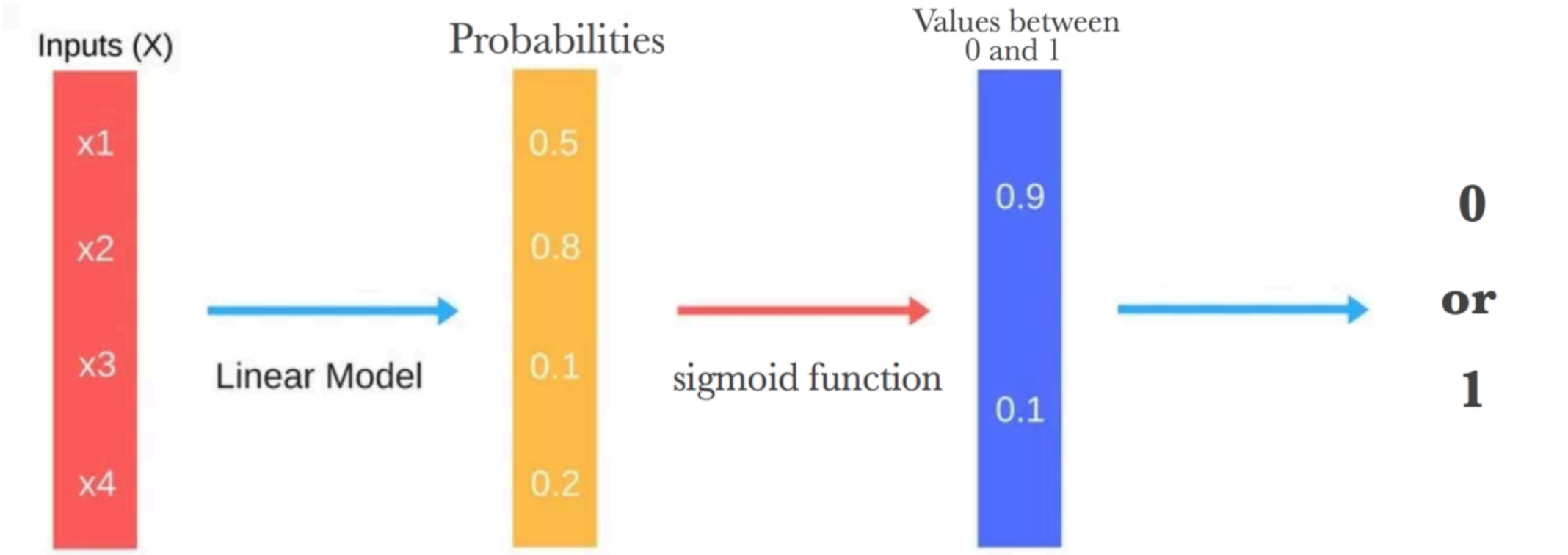
Linear versus Logistic Regression





Logistic regression ensures that our estimate for $p(X)$ lies between 0 and 1.



The Logistic Regression Algorithm

- **The Logit** is a function of the predictor variables that relates them to a 0/1 outcome

- Logit can be modeled as a linear function of the predictors

- The logit can be mapped back to a probability, which, in turn, can be mapped to a class

REFERENCES

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