Machine Learning Unsupervised Learning
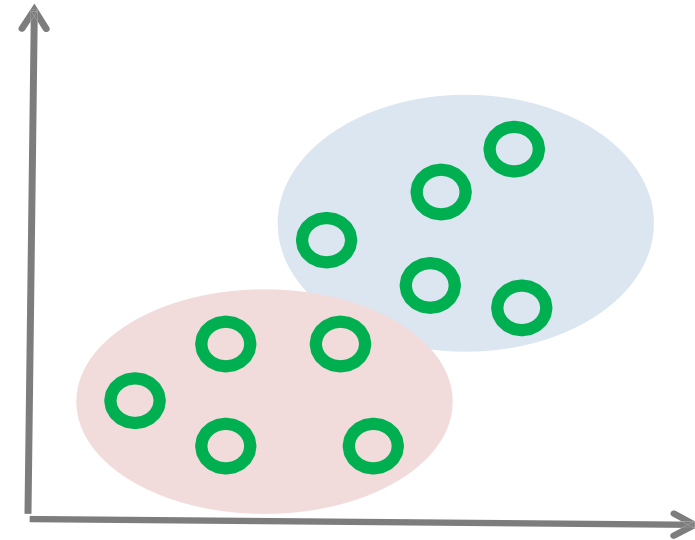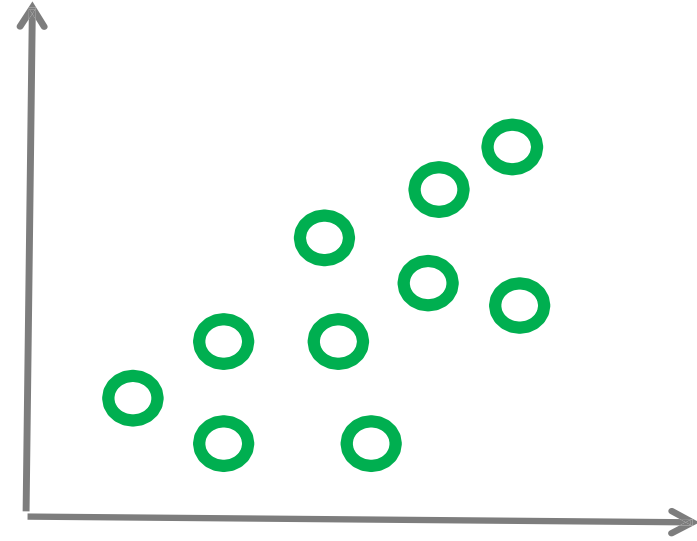# Association Rules

5CCS2INT – Introduction to Artificial Intelligence

Dr Tommy Thompson

Unsupervised Learning

- **Provided with a data set.**

- **Need to find an understanding of interesting relationships within that data.**

- **Identifying groups (clusters) of interesting information within the data.**

- **Can then be used to identify where new points 'fit' within the data set.**

- **Two common techniques: clustering and association rules.**

Association Rules

- **Let _X_ be an item-set, _X → Y_ an association rule and _T_ a set of transactions of a given database.**
  - The **support** value of _X_ with respect to _T_ is defined as the proportion of transactions which contains the item-set _X_.
  - The **confidence** value of a rule, _X → Y_ with respect to _T_ is the proportion of transactions that contains X which also contains _Y_.

Related to items you've viewed   See more
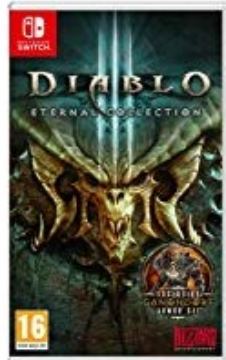
Association Rules Example

- **The tables contains 5 market basket transactions**
  - Of course, in real-life the dataset can consist of trillions of transactions

- **Calculate the support of the itemset {Milk, Diapers, Beer}**
  - The proportion of transactions that contain this itemset
  - 2/5 = 0.4

Trans ID	Items
1	Bread, Milk
2	Bread, Diapers, Beer, Eggs
3	Milk, Diapers, Beer, Cheesy puffs
4	Bread, Milk, Diapers, Beer
5	Bread, Milk, Diapers, Cheesy puffs

$$\{Milk\}. \frac{4}{5}$$

$$\frac{2}{5}$$

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Association Rules Example

- **The tables contains 5 market basket transactions**
  - Of course in real-life the dataset can consist of trillions of transactions

$$X \longrightarrow Y$$

- **Calculate the confidence of the association rule {Milk, Diapers} → {Beer}**
  - The proportion of transactions that contain {Milk, Diapers} which also contains {Beer}
  - (2/5)/(3/5) ≈ 0.67

Trans ID	Items
1	Bread, Milk
2	Bread, Diapers, Beer, Eggs
3	Milk, Diapers, Beer, Cheesy puffs
4	Bread, Milk, Diapers, Beer
5	Bread, Milk, Diapers, Cheesy puffs

$$\frac{\{Milk, Diapers, Beer\}}{\{Milk, Diapers\}} = \frac{2}{3}$$

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