

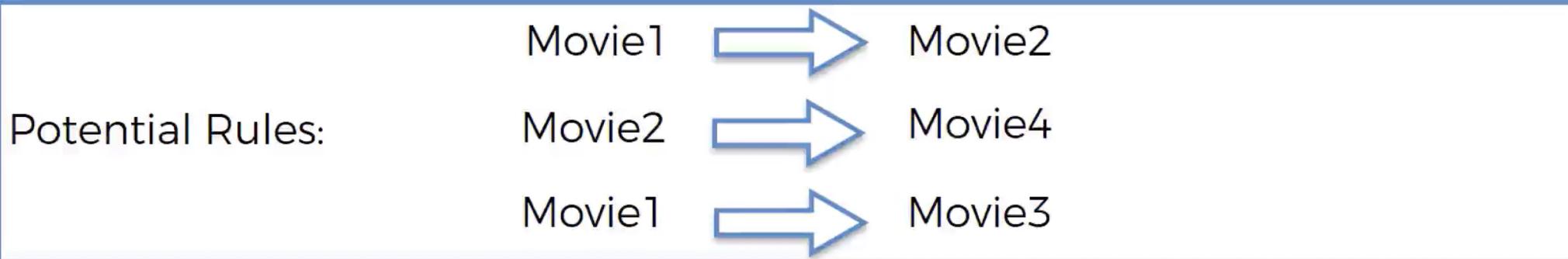
Association Rules

Association Rules



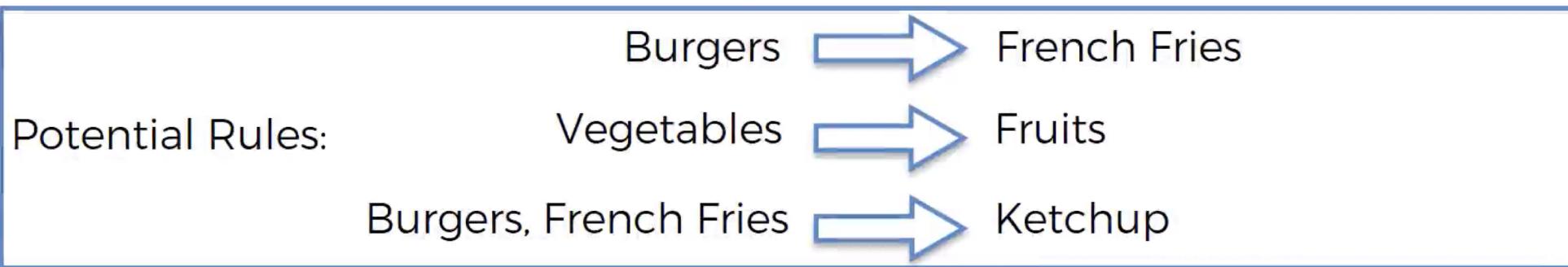
Movie Recommendation

User ID	Movies liked
46578	Movie1, Movie2, Movie3, Movie4
98989	Movie1, Movie2
71527	Movie1, Movie2, Movie4
78981	Movie1, Movie2
89192	Movie2, Movie4
61557	Movie1, Movie3



Market Basket Optimization

Transaction ID	Products purchased
46578	Burgers, French Fries, Vegetables
98989	Burgers, French Fries, Ketchup
71527	Vegetables, Fruits
78981	Pasta, Fruits, Butter, Vegetables
89192	Burgers, Pasta, French Fries
61557	Fruits, Orange Juice, Vegetables
87923	Burgers, French Fries, Ketchup, Mayo



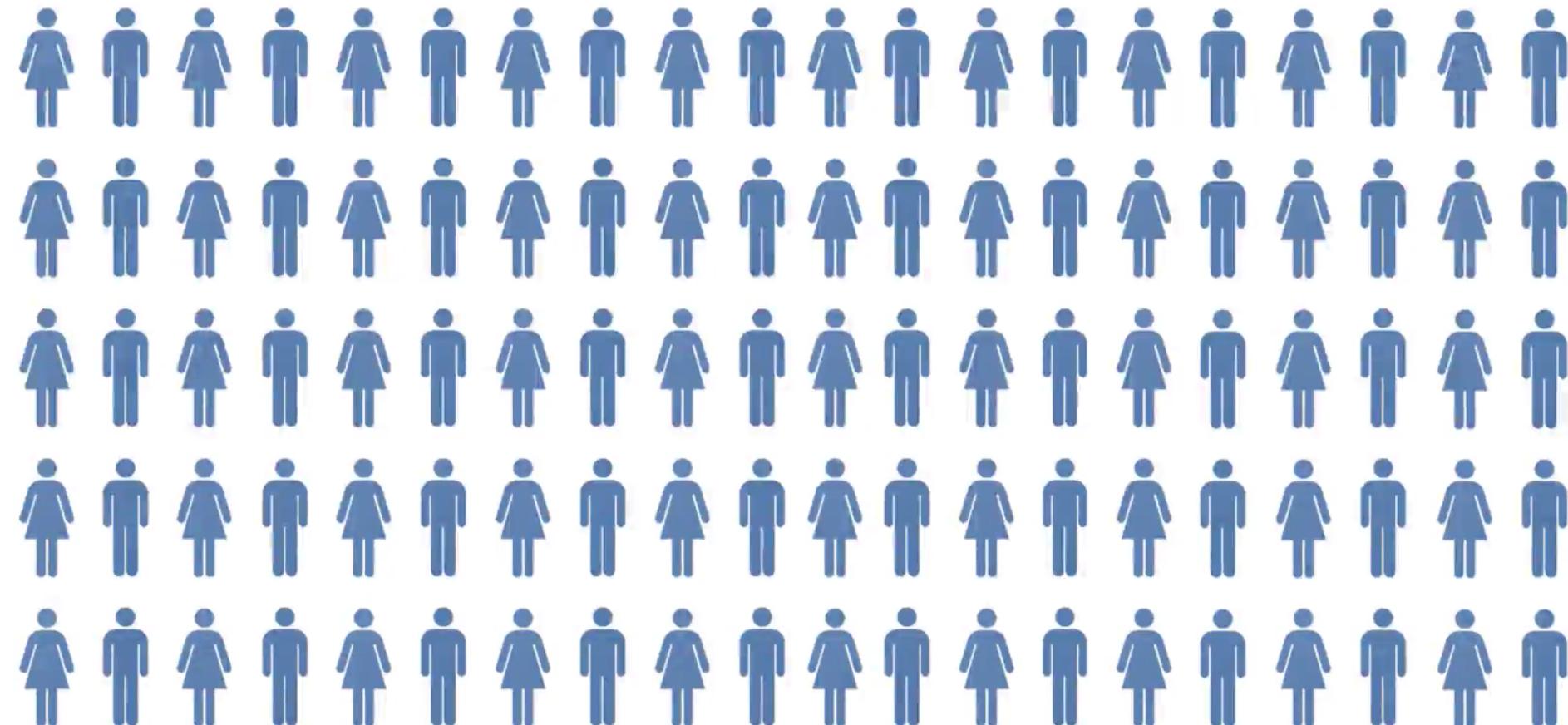
Apriori

Apriori - Support

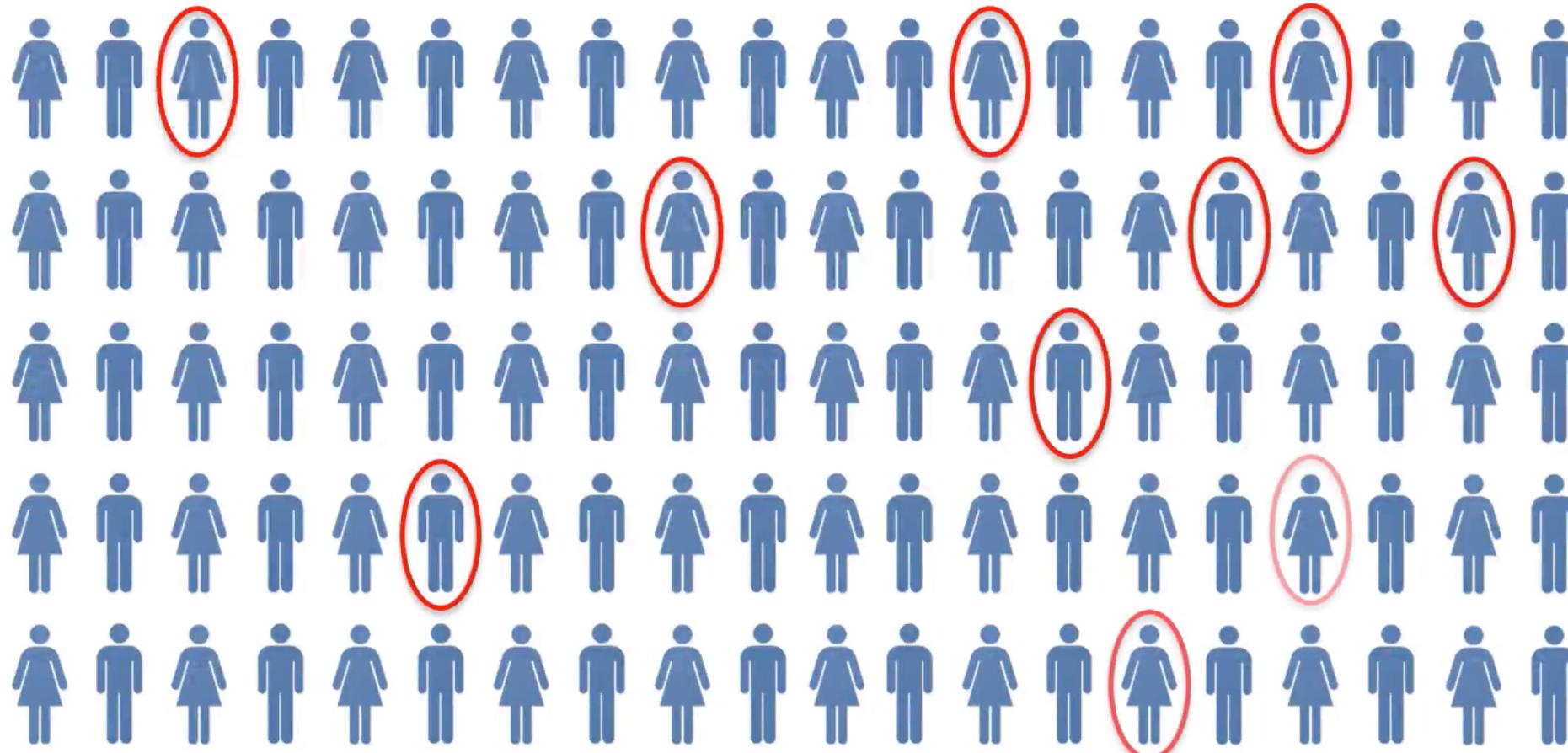
Movie Recommendation: $\text{support}(\mathbf{M}) = \frac{\# \text{ user watchlists containing } \mathbf{M}}{\# \text{ user watchlists}}$

Market Basket Optimisation: $\text{support}(\mathbf{I}) = \frac{\# \text{ transactions containing } \mathbf{I}}{\# \text{ transactions}}$

Apriori - Support



Apriori - Support



Support = $10/100$
= 10%

Apriori – Confidence

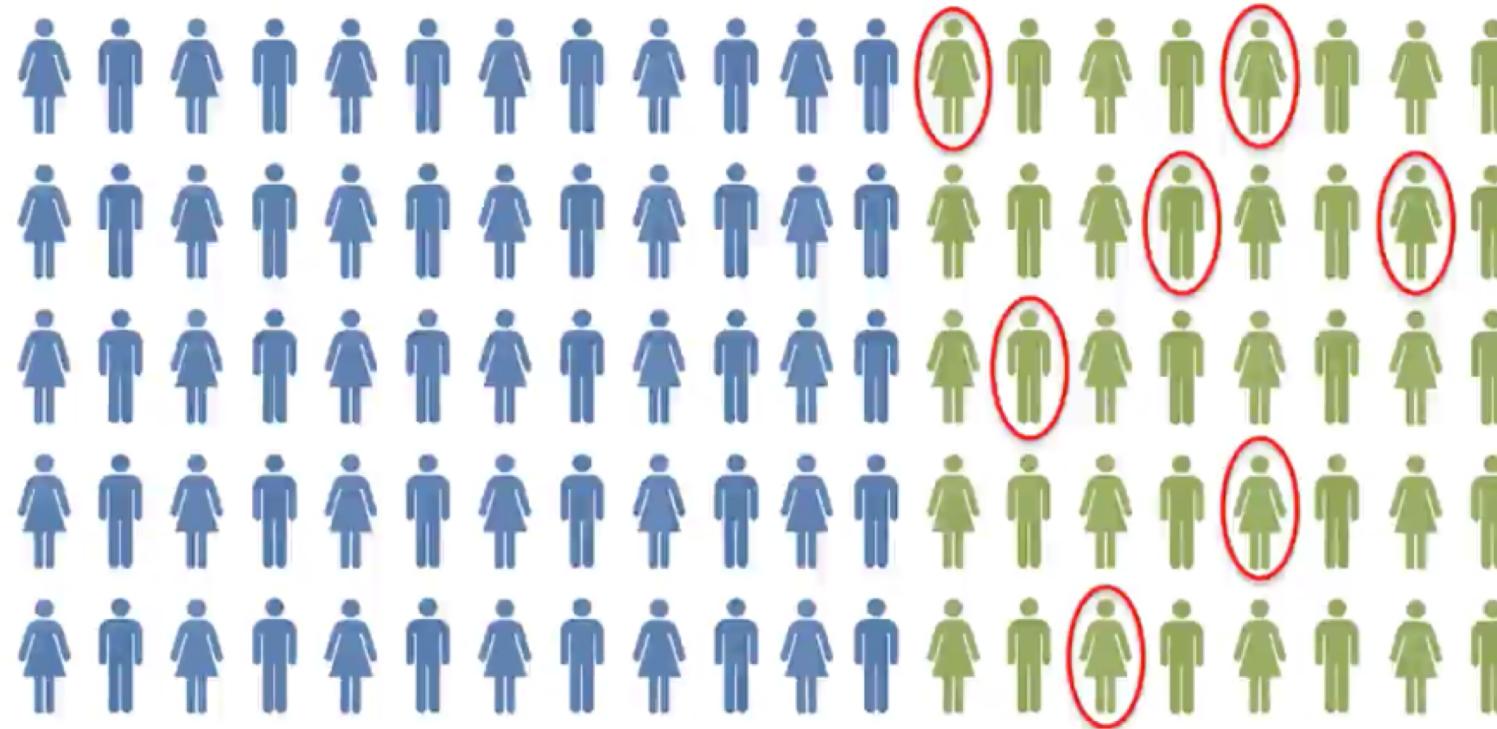
Movie Recommendation: $\text{confidence}(\mathbf{M}_1 \rightarrow \mathbf{M}_2) = \frac{\# \text{ user watchlists containing } \mathbf{M}_1 \text{ and } \mathbf{M}_2}{\# \text{ user watchlists containing } \mathbf{M}_1}$

Market Basket Optimisation: $\text{confidence}(\mathbf{l}_1 \rightarrow \mathbf{l}_2) = \frac{\# \text{ transactions containing } \mathbf{l}_1 \text{ and } \mathbf{l}_2}{\# \text{ transactions containing } \mathbf{l}_1}$

Apriori – Confidence



Apriori – Confidence



Confidence
 $= 7 / 40$
 $= 17.5\%$

Apriori – Lift

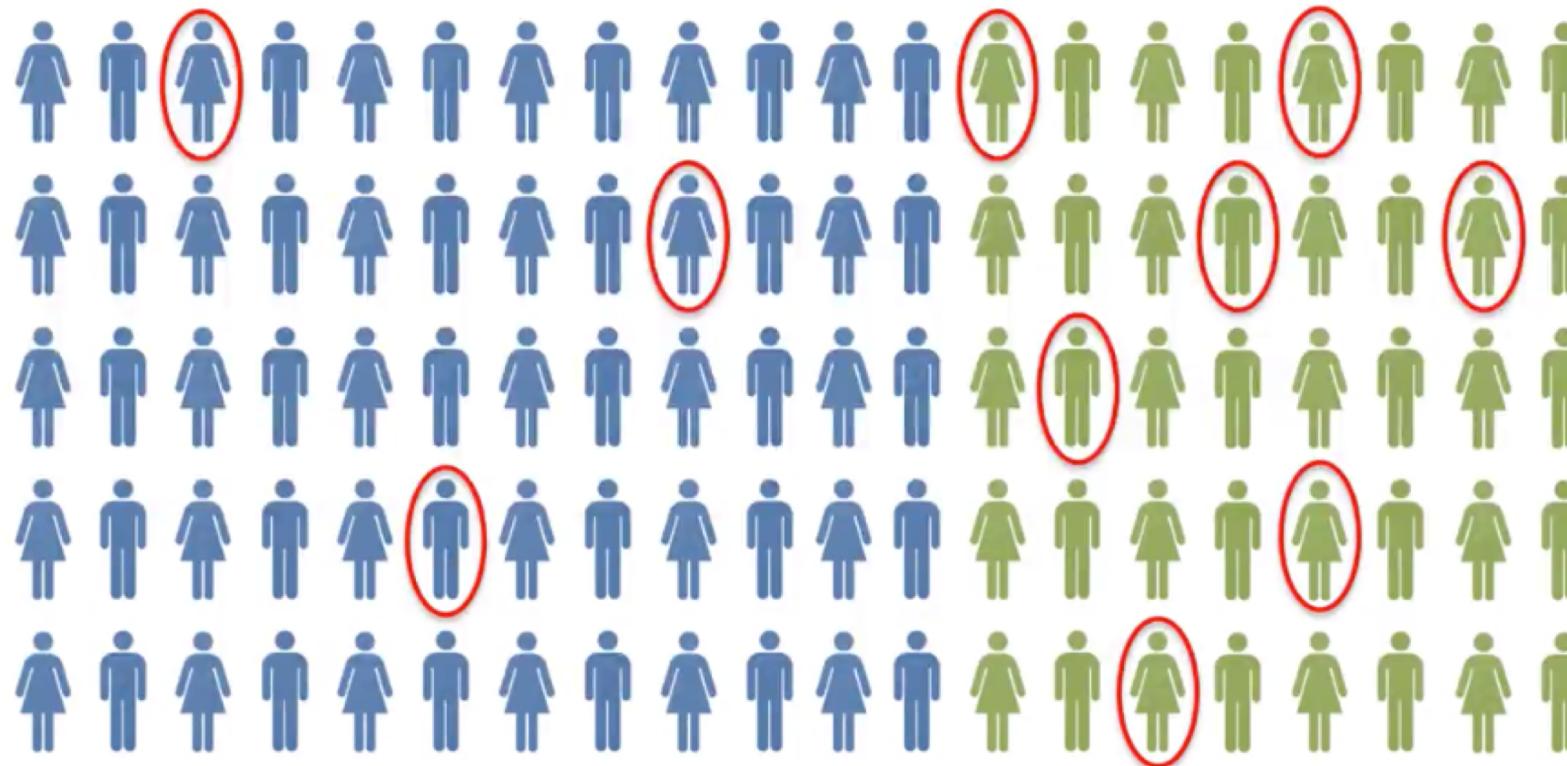
Movie Recommendation:

$$\text{lift}(\mathcal{M}_1 \rightarrow \mathcal{M}_2) = \frac{\text{confidence}(\mathcal{M}_1 \rightarrow \mathcal{M}_2)}{\text{support}(\mathcal{M}_2)}$$

Market Basket Optimisation:

$$\text{lift}(I_1 \rightarrow I_2) = \frac{\text{confidence}(I_1 \rightarrow I_2)}{\text{support}(I_2)}$$

Apriori – Lift



$$\begin{aligned} \text{Lift} &= 17.5\% / 10\% \\ &= 1.75 \end{aligned}$$

Apriori – Algorithm

- Set a minimum support and confidence
- Take all the subsets in transactions having higher support than minimum support
- Take all the rules of these subsets having higher confidence than minimum confidence
- Sort the rules by decreasing lift