User-Based Recommendation Approach

# 1. Methodology

Technique Used: User-Based Collaborative Filtering.  
Data Source: Synthetic partner-product purchase data, consisting of binary indicators for various product categories per partner.  
Processing:  
- Calculated user-user similarity using cosine similarity.  
- Top-N most similar partners were identified for each partner.  
- Recommended products that similar users have purchased but the current user hasn't.

# 2. Key Findings and Business Insights

- Most common recommendations: MCCB, VCU, RMU — highly overlapping across similar users.  
- Partner 001\_3: Frequently receives MCCB and Solar Solutions recommendations due to high similarity in purchase behavior with other partners.  
- Opportunity for scheme targeting: Partners with similar historical product interests can be grouped for bundling and discount schemes.  
- Top similar partners have >90% product overlap, indicating clear user clusters.

# 3. Assumptions

- Binary values represent purchase interest.  
- Users with similar past purchases will be interested in the same future products.  
- All products have equal weight in similarity computation.

# 4. Limitations

- Ignores product pricing and temporal dynamics.  
- Cold-start issue for new partners.  
- Does not account for product hierarchy (e.g., ACB vs MCCB similarity).

# 5. Edge Cases

- New partners with no purchase history (handled via popularity-based fallback).  
- Users with rare product combinations may not get good matches.

# 6. Reference Links

- https://surprise.readthedocs.io/en/stable/  
- https://scikit-learn.org/stable/modules/generated/sklearn.metrics.pairwise.cosine\_similarity.html  
- https://towardsdatascience.com/collaborative-filtering-recommender-systems-d9b75a9dcb49