A Rough Set-Based Association Rule Approach

Recommendation System for Online Consumers | **Liao** & **Chang** (2016)

Presentation made by **Ondřej Marvan**

THE PROBLEM

Traditional recommendation systems focus on **probability of purchase** rather than **sensitivity to recommendations**.

THE GAP

Most systems struggle to process **ordinal data** (rankings/preferences), focusing on nominal data only.

OBJECTIVE

Develop a system using **Rough Set Theory** and **AHP** to analyze ordinal preferences and drive behavioral changes.

Why This Method?

1. **Rough Set Theory (RST)**
   Classifies uncertain/incomplete info without prior knowledge
2. **Analytic Hierarchy Process (AHP)**
   Pairwise comparison determines strength of preferences
3. **Association Rules (Apriori)**
   Generates predictive if-then rules for personalization

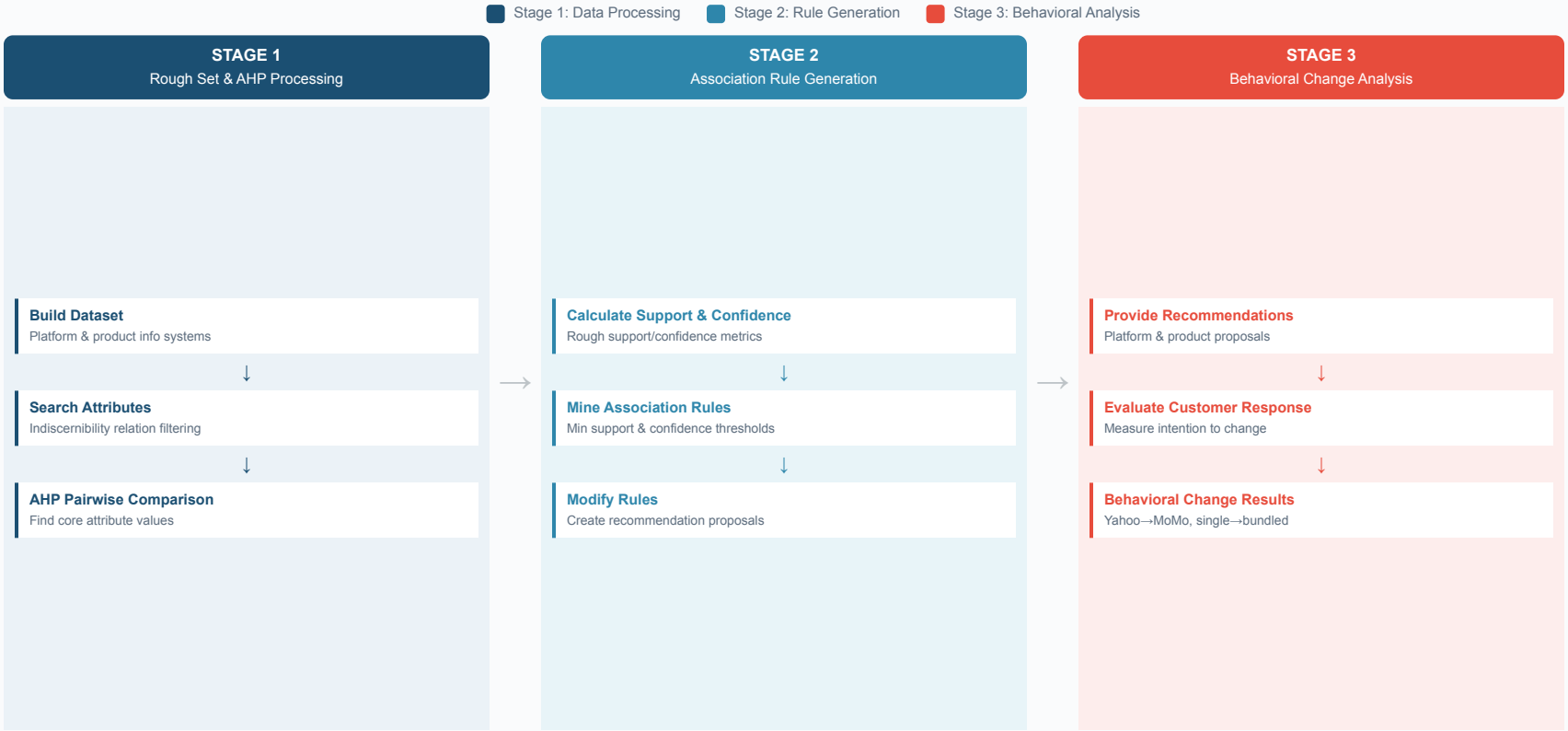
Key Innovation

Combines RST + AHP + Association Rules for ordinal scale e-commerce recommendations

Source: Information Processing and Management 52 (2016) 1142-1160

Research Framework: Methodology Flow Chart

Three-stage process for generating recommendations and evaluating behavioral impact



Framework adapted from Liao & Chang (2016), Figure 1

Key Innovations vs. Traditional Methods

What distinguishes this approach from existing recommendation systems

Feature	Traditional Systems	Proposed Approach
Data Focus	Nominal/Binary (Bought/Not Bought)	**Ordinal Scale (Preference Rankings)**
User Insight	Common/General Preferences	**Preference Sensitivity & Personalization**
Scaling	Cold-start & Sparsity Issues	**Attribute Reduction to Core Data**
Goal	Increase Purchase Probability	**Behavioral Change (Platform Shifts)**

NOVEL METRICS

Replaces traditional accuracy with **Rough Support** and **Rough Confidence** to evaluate rules in uncertain datasets.

Practical Outcome

Successfully shifted customer loyalty from **strong platforms** (Yahoo) to **weaker ones** (MoMo) via product bundling.

Behavioral Change Evidence

- Platform shifts: Yahoo → MoMo
- Product bundling acceptance
- Cross-selling effectiveness

"The recommendation decision should determine a customer's sensitivity to such a recommendation, not just probability of purchase."

— Based on Bodapati (2008)