

# Banking credit worthiness: Evaluating the complex relationships

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**Omega**   Volume 83   2019

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**October 2019**

# Problem Definition

## Problem

**Farmer credit** is a matter for economic sustainable development and poverty in many developing countries. **Credit evaluation** remains a **complex activity** magnified by farmers characteristics and contextual environmental factors, which makes **predicting credit level** much more difficult.

## Data

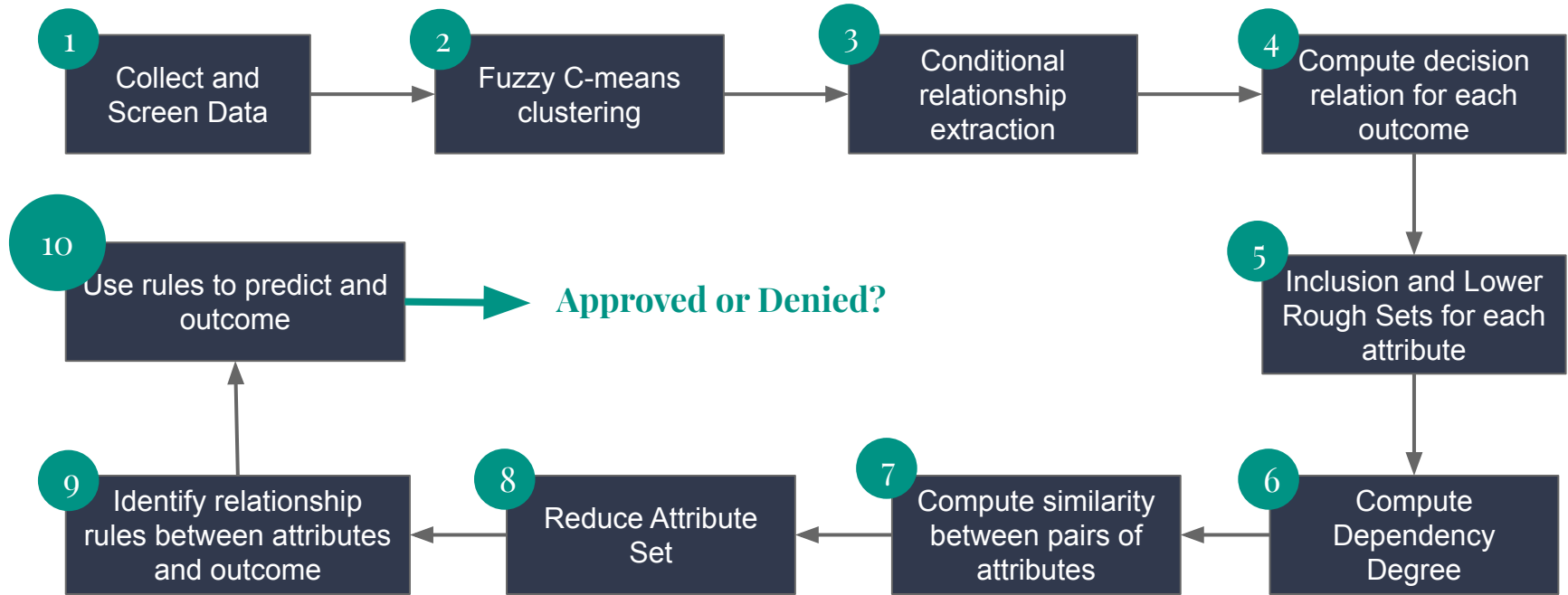
Data collected from a Chinese state-owned commercial bank:

- **2044 farmer loans** due on October 2009
- Amounts between 10.000 yuan (**USD 1,500**) and 200.000 yuan (**USD 31,000**)
- Nationwide samples from **28 provinces** (geographically diverse data)
- **43 conditional attributes** analyzed such as operation capacity, willingness of repayment, ect.

## Goal

Propose a formal methodology to **identify various relationships** between **farmers' characteristics** and **environmental factors** with **creditworthiness**, to aid financial institutions improve credit decisions

# Functional Design



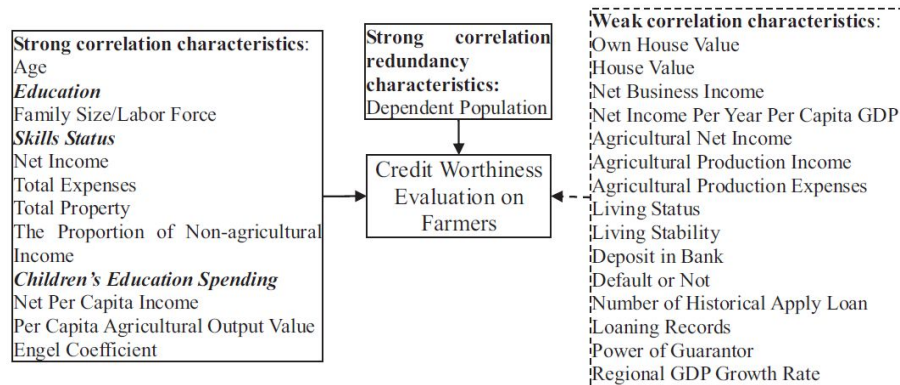
# Used Methods

1. Fuzzy Rough-Set Theory (Fuzzy RST) for determining complex non-linear relationships
2. Fuzzy C-means (FCM) for data discretization
3. Dependency Degree computation for removing unimportant attributes
4. Computing similarity and correlation between conditional attributes
5. Computing information significance of an attribute and excluding attributes with small information significance values
6. Rough Set Exploration System (RSES) for relationship rules identification



# Evaluation

- **13,774** generated rules
- 3 different scenarios
- **33% predictive accuracy** for **highest level** of creditworthiness
- **93.7% predictive accuracy** for level 1 of creditworthiness (**lowest level**)



Creditworthiness level	The number of farmers in prediction (second) group	Initial scenario		Scenario 1		Scenario 2	
		Rules	Accuracy	Rules	Accuracy	Rules	Accuracy
Very low creditworthiness level	143	7182	93.70%	7012	92.30%	6976	90.90%
Low creditworthiness level	74	4365	64.90%	4187	62.20%	4083	61.50%
High creditworthiness level	21	1867	66.70%	1858	58.10%	1726	57.70%
Very high creditworthiness level	6	360	33.30%	303	16.70%	231	13.70%
Sum/average	244	13,774	81.16%	13,360	78.37%	13,016	77.23%