

BANK LENDING DECISION SYSTEM



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PROBLEM STATEMENT

- GIVEN THE DATA OF 10 CUSTOMERS WE HAVE TO FIND THE CONFIGURATION OF THE CUSTOMERS TO WHOM BANK LEND THE CREDIT IN ORDER TO MAXIMIZE ITS PROFIT



OR





FLOW OF PROJECT

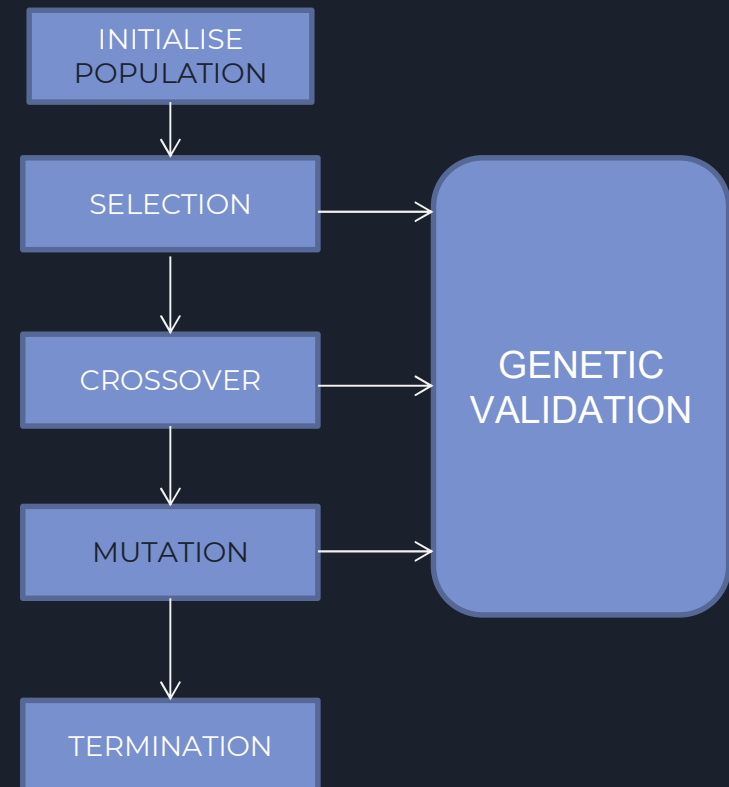
- **APPROACH:**

- GENETIC ALGORITHM:
 - INITIALIZATION
 - SELECTION
 - Crossover
 - MUTATION
 - GENETIC EVALUATION
 - TERMINATION
- TABU SEARCH ALGORITHM:
 - INITIALIZATION
 - GENERATING NEIGHBOURS
 - EVALUATING SOLUTION
 - ASPIRATION CRITERIA
 - TERMINATION
- AMALGAMATION OF GENETIC ALGORITHM AND TABU SEARCH



UNDERSTANDING THE FLOW OF GA

• GENETIC ALGORITHM:





IMPLEMENTATION OF GENETIC ALGORITHM

● INITIALIZATION AND SELECTION

- INITIALISED THE CUSTOMERS DATA USING 2-D ARRAY AND MAPPED THOSE CUSTOMERS USING SPECIFIC IDS
- ROULETTE WHEEL SELECTION HAS BEEN IMPLEMENTED FOR PICKING UP 60 CHROMOSOMES FROM THE SET OF POPULATION

● CROSSOVER AND MUTATION

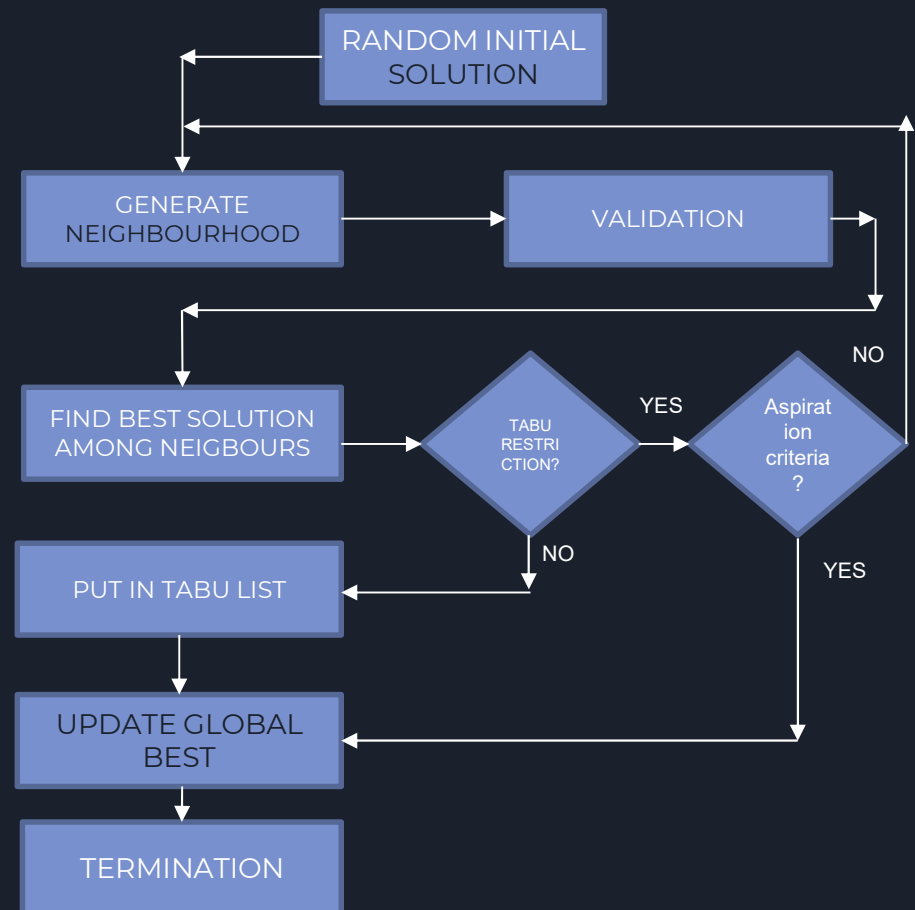
- CARRIED OUT SINGLE POINT CROSSOVER WITH CROSSOVER PROBABILITY OF 0.8 AND HAVE ENSURED THAT NEW GENERATED CHILDREN FOLLOWS CONSTRAINT.
- MUTATION HAS BEEN CARRIED OUT WITH MUTATION PROBABILITY OF 0.006.

● GENETIC EVALUATION

- ENSURED THAT ALL THE CHROMOSOMES PRESENT IN THE POPULATION AS WELL AS NEWLY GENERATED CHROMOSOME FOLLOWS THE CONSTRAINT AS GIVEN IN THE PAPER.

TABU SEARCH

• TABU – SEARCH ALGORITHM





TABU SEARCH

- **DEFINING TABU STRUCTURE**
 - DEFINED A UNIQUE DICTIONARY TO STORE THE SWAPPING MOVE.
 - THE KEY IS A PAIR CONTAINING SWAPPING MOVE.
 - THE VALUE CONTAINING TWO ATTRIBUTES TABU-TIME AND FITNESS VALUE.
- **INITIALIZATION AND EVALUATION**
 - INITIALIZED THE CHROMOSOME AS THE SOLUTION IN TABU-SEARCH.
 - NEIGHBOURED SOLUTION IS GENERATED BY RANDOMLY SWAPPING THE BITS.



AMALGAMATION

AMALGAMATION OF GENETIC ALGORITHM AND TABU SEARCH (GA-TABU)

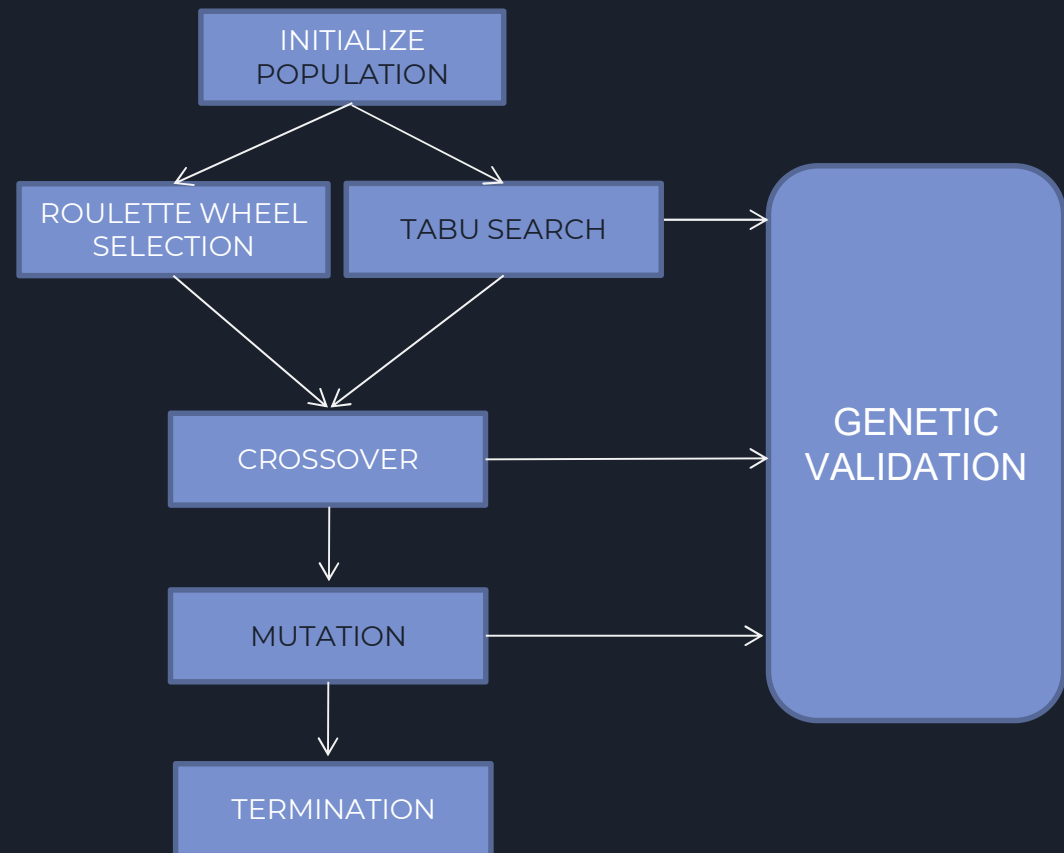
- **INTUITION BEHIND GA-TABU**

- IN REAL BANKING SCENARIO DUE TO LARGE NUMBER OF LOAN APPLICANTS SELECTION PRESSURE WOULD BE LOW.
- THEREBY DECREASING THE PROBABILITY OF GETTING BEST SOLUTION SELECTED.



FLOW OF AMALGAMATION

- GA-TABU ALGORITHM:





THE ALGORITHM

AMALGAMATION OF GENETIC ALGORITHM AND TABU SEARCH (GA-TABU)

- MODIFIED THE SELECTION PROCESS OF GENETIC ALGORITHM.
- 59 CHROMOSOME HAVE BEEN SELECTED USING ROULETTE WHEEL SELECTION.
- 1 CHROMOSOME HAVE BEEN INDUCED BY USING TABU-SEARCH THUS MAKING SURE WE ALWAYS HAVE AN NEAR-OPTIMAL SOL. SELECTED IN EACH GENERATION.

ID	LOAN SIZE	INTEREST RATE	RATING	LOSS
3	4	0.021	A	0.0001
5	18	0.025	BBB	0.0024
6	3	0.026	AAA	0.0002
7	17	0.023	BB	0.0058
9	9	0.028	A	0.001

RESULTS

GENETIC ALGORITHM RESULTS

BEST CONFIGURATION:
[0, 0, 1, 0, 1, 1, 1, 0, 1, 0]

FITNESS FUNCTION VALUE
= 2.734

TOTAL LOAN VALUE = 51

ID	LOAN SIZE	INTEREST RATE	RATING	LOSS
4	11	0.027	AA	0.0003
5	18	0.025	BBB	0.0024
6	3	0.026	AAA	0.0002
9	9	0.028	A	0.001
10	10	0.022	A	0.001

RESULTS

TABU SEARCH RESULTS

BEST CONFIGURATION:
[0, 0, 0, 1, 1, 1, 1, 0, 1, 1]

FITNESS FUNCTION VALUE
= 2.636

TOTAL LOAN VALUE = 51

ID	LOAN SIZE	INTEREST RATE	RATING	LOSS
1	10	0.021	AAA	0.0002
3	4	0.021	A	0.0001
4	11	0.027	AA	0.0003
6	3	0.026	AAA	0.0002
9	9	0.028	A	0.001
10	10	0.022	A	0.001

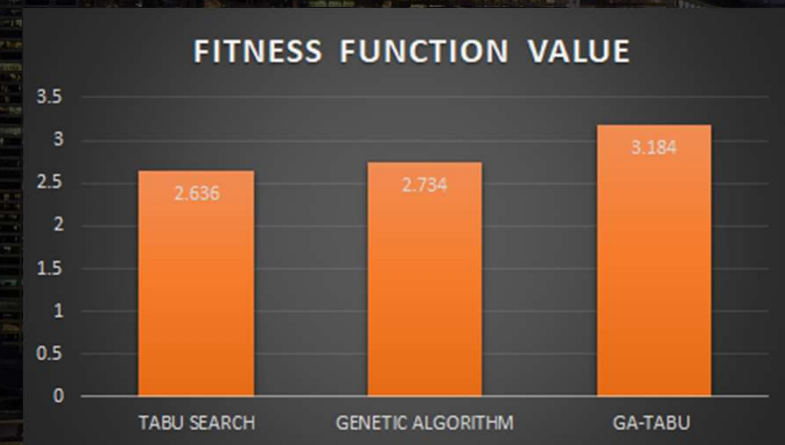
RESULTS

GA-TABU RESULTS

BEST CONFIGURATION
[1, 0, 1, 1, 0, 1, 0, 0, 1, 1]

FITNESS FUNCTION VALUE
= 3.184

TOTAL LOAN VALUE = 47



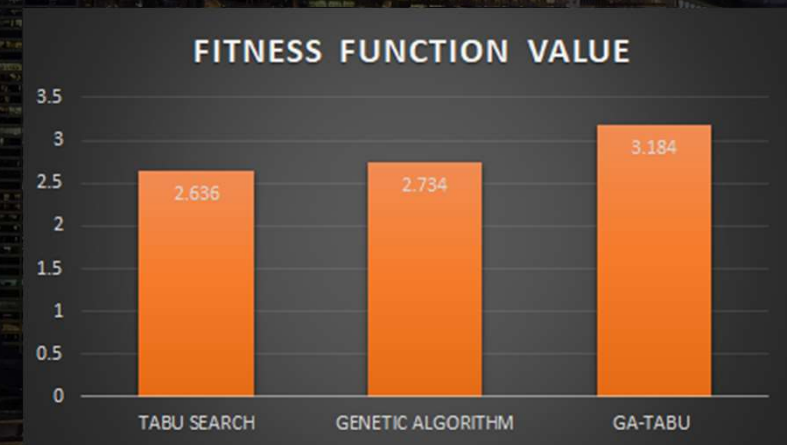
ALGORITHM	BEST CONFRIGATION	FITNESS VALUE	TOTAL LOAN VALUE
GA	[0, 0, 1, 0, 1, 1, 1, 0, 1, 0]	2.734	51
TABU SEARCH	[0, 0, 0, 1, 1, 1, 1, 0, 1, 1]	2.636	51
GA-TABU	[1, 0, 1, 1, 0, 1, 0, 0, 1, 1]	3.184	47

RESULTS

GA-TABU RESULTS

BEST CONFIGURATION
[1, 0, 1, 1, 0, 1, 0, 0, 1, 1]

FITNESS FUNCTION VALUE
= 3.184
TOTAL LOAN VALUE = 47





THANK YOU

THE BEAUTIFUL THING ABOUT
LEARNING IS NOBODY CAN TAKE IT
AWAY FROM YOU
~ B.B King