POPULATION MIGRATION ALGORITHM FOR EIGEN VALUE OF MATRIX

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INTRODUCTION

- Eigenvalue problems are fundamental in science and engineering, used in applications such as stability analysis and vibration systems.

- Traditional methods (e.g., iterative, transformation) face issues like slow convergence, low precision, and high memory usage.

- The paper proposes the Population Migration Algorithm (PMA), inspired by human migration, as a solution for eigenvalue and eigenvector computations.

METHODOLOGY

- PMA is inspired by human migration patterns.
- Initialize population
- Evaluate fitness
- Mobility
- Migration
- Contraction or diffusion

ADVANTAGE

- High precision and fast convergence.

- Handles complex eigenvalues and multiple eigenvalues effectively.

- Avoids falling into local optima due to diffusion step.

- Flexible and can be applied to a variety of matrix problems.

DISADVANTAGE

- Computationally intensive for large matrices.

- Sensitive to parameter settings (e.g., population size, contraction factor).

- Stochastic nature introduces variability in results.

- Implementation complexity compared to traditional methods.

APPLICATIONS

- Static stability analysis in electrical systems.
- Vibration analysis in structural and mechanical systems.
- Optimization tasks in computational mathematics.
- Determination of critical values in engineering designs.
- Solving large-scale eigenvalue problems in physics and data science.

THANK YOU