Matrix Inversion

Data Science / Machine Learning Approach

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Matrix Inversion Applications

Markov Chains: Matrix inversion is utilized in the study of Markov chains, a mathematical system that undergoes transitions between different states. The stationary distribution of a Markov chain can be found by solving a system of linear equations involving matrix inversion.

Optimization: In optimization problems, especially in linear programming, matrix inversion is employed to find optimal solutions. The inversion of matrices is often part of algorithms that iteratively improve solutions until an optimum is reached.

Control Systems: In control theory, matrix inversion is used to design controllers for dynamic systems. It plays a crucial role in determining the control law that stabilizes a system and achieves desired performance.

Computer Graphics: Matrix inversion is used in computer graphics to transform and manipulate 3D graphics. Techniques like affine transformations and perspective projection involve matrix operations, including inversion.

Image Processing: In image processing, matrix inversion is applied to techniques like image registration and geometric transformations. This is important in aligning and transforming images for further analysis.

Quantum Mechanics: Matrix inversion is frequently used in quantum mechanics, particularly in the representation of quantum states and the evolution of quantum systems.

Machine Learning: In machine learning, matrix inversion can be involved in certain algorithms, such as linear regression or certain optimization problems. However, due to computational considerations, alternative methods like gradient descent are often preferred.

Matrix Inversion

A better formula for Matrix Inversion can invert matrices FASTER

With a faster/less computationally intensive formula large matrices that are currently un-invertible due to time complexity will now be INVERTIBLE

Capstone Results

Linear Regression

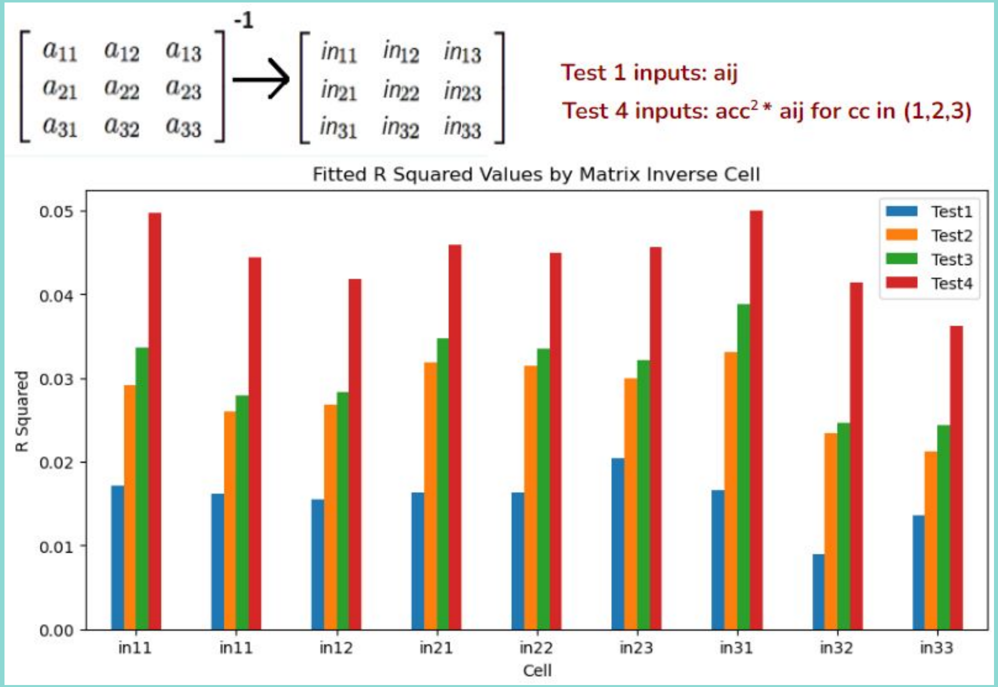
Modelling Inversion terms with an R Squared value of 0.044 and

Discovered which combinations of matrix elements were more valid for modelling the inverse

Neural Networks

Predict Eigenvector and Eigenvalues with a mean error of 1.7%

Linear Regression Result



Next Steps

Expand on Neural Network modelling

Model Adjoint matrices

Combine Machine Learning techniques towards a single solution

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Github Repo via QR code