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BA Economics Honours | Semester V | Calicut University

Big Data Analysis in Economics

Course Code: ECO5FS112 • Module 3

Module III: Using Big Data to Advance Economic Theory

Bridging computer science architectures with economic theory enables economists to simulate complex adaptive systems, evaluate public policy counterfactuals, and decipher financial market microstructure.

Unit 8, 9 & 10: Big Data Technology Architectures and Policy Prediction

- **Distributed Storage and Processing Architectures:** Handling datasets exceeding single-machine memory through distributed clusters:
  - *Apache Hadoop & HDFS:* Fault-tolerant distributed file system with MapReduce batch processing.
  - *Apache Spark:* High-speed in-memory data processing engine widely used for scalable machine learning pipelines.
  - *NoSQL Databases (MongoDB, Cassandra):* Scalable schemaless storage for unstructured web feeds and social media corpora.
- **Machine Learning for Public Policy:** Machine learning optimizes predictive policy problems (Sendhil Mullainathan & Jens Ludwig):
  - Predicting which agricultural regions are most vulnerable to drought for pre-emptive drought relief allocation.
  - Targeting tax audit inspections toward high-probability evasion returns.
  - Risk-scoring bail decisions to minimize pretrial flight risk while eliminating subjective racial or caste bias.

Unit 11 & 12: Micro-Data for Macro Questions and High-Frequency Finance

- **Heterogeneous Agent Macroeconomics:** Using administrative tax records and bank transaction logs to calibrate models with rich household heterogeneity in wealth, income, and marginal propensities to consume (HANK models).
- **High-Frequency Algorithmic Trading (HFT):** Quantitative finance models utilizing millisecond-level limit order book data, co-located servers, and automated market-making algorithms to exploit microstructure price discrepancies.

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Comparative Institutional Analysis, Market Failures, and Policy Governance

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Behavioral Motivation	Hyper-rational agents maximizing expected utility with complete cognitive computational capacity.	Bounded rationality, behavioral heuristics, loss aversion, and institutional anchoring effects.	Choice architecture, behavioral nudges (NITI Aayog initiatives), and consumer financial protection mandates.
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Policy Synthesis and Analytical Evaluation

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