cross-sectoral ecosystems are transforming information into the foundation for innovative products and services.

However, growth is being hindered by fragmented regulation, ethical dilemmas related to privacy and digital inequality, and increasing cyber risks. In response, new legal concepts, trusted exchange models, and international standards are emerging to balance innovation, security, and human rights. In the geoeconomic dimension, this is creating a competition for technological sovereignty and redefining the boundaries of digital influence.

Based on the results of the conducted research, it can be concluded that the emerging data market has already become a key driver of the global economy. The data has confirmed its status as a strategic asset that requires new approaches to evaluation and regulation. Therefore, the future of the market depends on addressing the complex challenges at the intersection of technology, economics, and law. Ultimately, this will lead to the creation of a balanced ecosystem that ensures both sustainable growth and equitable distribution of digital benefits.

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PREDICTIVE ANALYTICS AND DEMAND FORECASTING: HOW TO USE ADVANCED ANALYTICS, MACHINE LEARNING, AND SCENARIO MODELING TO REDUCE INVENTORY AND IMPROVE CUSTOMER SATISFACTION

Интеллектуальная аналитика и прогнозирование спроса: как использовать продвинутую аналитику, машинное обучение и сценарное моделирование для снижения запасов и повышения удовлетворенности клиентов

Predictive analytics is a set of video processing algorithms: object detection, trajectory tracking, facial and license plate recognition, people counting, and anomaly detection. The algorithms are trained on big data and operate in real time, filtering out false positives and generating manageable alerts.

Methodology Evolution: From Statistical Extrapolation to Machine Learning-Based Predictive Analysis A key limitation of traditional forecasting models (such as ARIMA and exponential smoothing) is their reactive nature. They effectively handle stable trends and seasonality, extrapolating from the past to the future, but fail when faced with non-stationary processes, structural shifts in the data, and the influence of numerous external factors.

Machine learning overcomes this barrier, moving from descriptive analysis to predictive and even prescriptive analytics. This approach relies on the use of algorithms capable of learning from data without explicit programming. In the context of demand forecasting, the most relevant are:

Ensemble methods (Random Forest, Gradient Boosting): These algorithms build multiple «weak» models (e.g., decision trees), which together produce a highly accurate and noise-robust forecast. Their key advantage is the ability to automatically select the most significant features and model nonlinear interactions.

Recurrent neural networks (RNN, LSTM): Specialized neural network architectures designed to work with sequential data. They are ideal for time series analysis, as they «remember» long-term dependencies and context, which is critical for accounting for complex seasonal patterns.

The power of ML models is unlocked by their ability to handle multidimensional data. Data integration allows the model to answer not just the question «How much will we sell?» but also «Why will we sell that much?», identifying cause-and-effect relationships.

Scenario Modeling: Proactive Management in a Stochastic Environment An accurate forecast does not eliminate the existence of risks. Scenario modeling (Simulation & What-if Analysis) is a method that allows one to go beyond a single «probable» future and evaluate the consequences of implementing various hypotheses. The mathematical basis is often the Monte Carlo method, which, through repeated randomization of key parameters (e.g., delivery time, demand level) in given distributions, creates a probabilistic picture of the future.

For example, modeling the scenario «a 14-day disruption of supplies from Asia» allows one to calculate in advance the required volume of buffer stocks in regional hubs to maintain a target service level of 98 % and to assess the financial consequences of their creation. Achieving Synergy: Linking Inventory Optimization and Customer Centricity The implementation of intelligent analytics creates closed-loop planning, where forecasts are continuously updated based on new data, and plans are adjusted. This creates a synergistic effect, resulting in the simultaneous optimization of two key metrics.

Thus, intelligent systems transform inventory management from a cost function into a strategic tool for enhancing customer centricity and ensuring a sustainable competitive advantage.