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আপনি যদি শূন্য থেকে মেশিন লার্নিং শিখতে চান তবে শুধুমাত্র এই গাইডলাইন টি ফলো করলেই আপনার জার্নিটা সুন্দর হবে, ইনশাআল্লাহ।

## 1. Programming Skills:

- ❖ **Python:** Most commonly used in machine learning for its simplicity and the vast availability of libraries (like NumPy, Pandas, Matplotlib, Scikit-learn, TensorFlow, and PyTorch).
- ❖ **SQL:** For data manipulation and retrieval.

## 2. Mathematics:

- ❖ **Statistics and Probability:** Descriptive statistics, Understanding distributions, Statistical tests, Bayesian concepts, and Probability theories.
- ❖ **Linear Algebra:** Concepts like matrices, vectors, and their operations are crucial.
- ❖ **Calculus:** Essential for understanding the optimization techniques used in machine learning algorithms.

## 3. Data Handling:

- ❖ **Data Preprocessing:** Techniques for cleaning and preparing data for analysis (Pandas, Numpy, Polars, SciPy).
- ❖ **Data Visualization:** Skills in tools and libraries for visualizing data to extract insights (Matplotlib, Plotly, Seaborn, Holoviews, hvPlot).

## 4. Machine Learning & Deep Learning Algorithms:

- ❖ **Supervised Learning:** Linear regression, Logistic Regression, SVM, Decision trees, Random forests, Lasso, Ridge, XgBoost, AdaBoost, CatBoost, AR, MA, ARIMA, Prophet, CNN, ANN, RNN, LSTM, GRU, BERT, GPT, T5, etc.
- ❖ **Unsupervised Learning:** Clustering, Principal component analysis (PCA), LDA, Anomaly Detection.
- ❖ **Reinforcement Learning:** Algorithms like Q-learning, SARSA, and Deep Reinforcement Learning.
- ❖ **Tuning and Optimization:** Techniques like gradient descent, backpropagation, and hyperparameter tuning.
- ❖ **Natural Language Processing:** Techniques and models for text data understanding and generation.

## 6. Machine Learning Theory:

- ❖ **Bias-Variance Tradeoff:** Understanding the trade-offs between overfitting and underfitting.
- ❖ **Evaluation Metrics:** Accuracy, precision, recall, F1 score, ROC curve, etc.
- ❖ **Model Selection and Validation:** Techniques like cross-validation and grid search.
- ❖ **Regularization:** L1 Regularization, L2 Regularization.

## 7. Practical Applications:

- ❖ **Project Experience:** Hands-on experience through projects or internships.
- ❖ **Problem Solving:** Ability to apply machine learning techniques to solve real-world problems.
- ❖ **Ethics and Privacy:** Understanding the ethical implications and privacy concerns in deploying machine learning models.

## 8. Staying Updated:

- ❖ **Continued Learning:** Machine learning is a rapidly evolving field, so staying updated with the latest research, tools, and best practices is crucial.
- ❖ **Participation in Competitions:** Platforms like Kaggle offer a way to practice and enhance your skills competitively.
- ❖ **Knowledge Sharing:** You can share your knowledge on LinkedIn.

## Learning Resources:

- ❖ [Free Resources](#)
- ❖ [Paid Resources](#)