Prepared by:
[Rashedul Alam Shakil](#)
Works at Siemens, Germany
Founder of Study Mart
Founder of aiQuest Intelligence
Master in Data Science at FAU Erlangen

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

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, norms, eigenvalues, eigenvectors, and Gaussian elimination, 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, KNN, Polynomial 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.

Learn Machine Learning: www.aiquest.org.

- ❖ **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, Bias, Variance.
- ❖ **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.
- ❖ **Imbalance Dataset:** Oversampling, Undersampling, SMOTE.

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:
- ❖ [How to Learn?](#)
- ❖ [Free Resources](#)
- ❖ [Paid Resources](#)