Machine Learning in Finance

LINK:

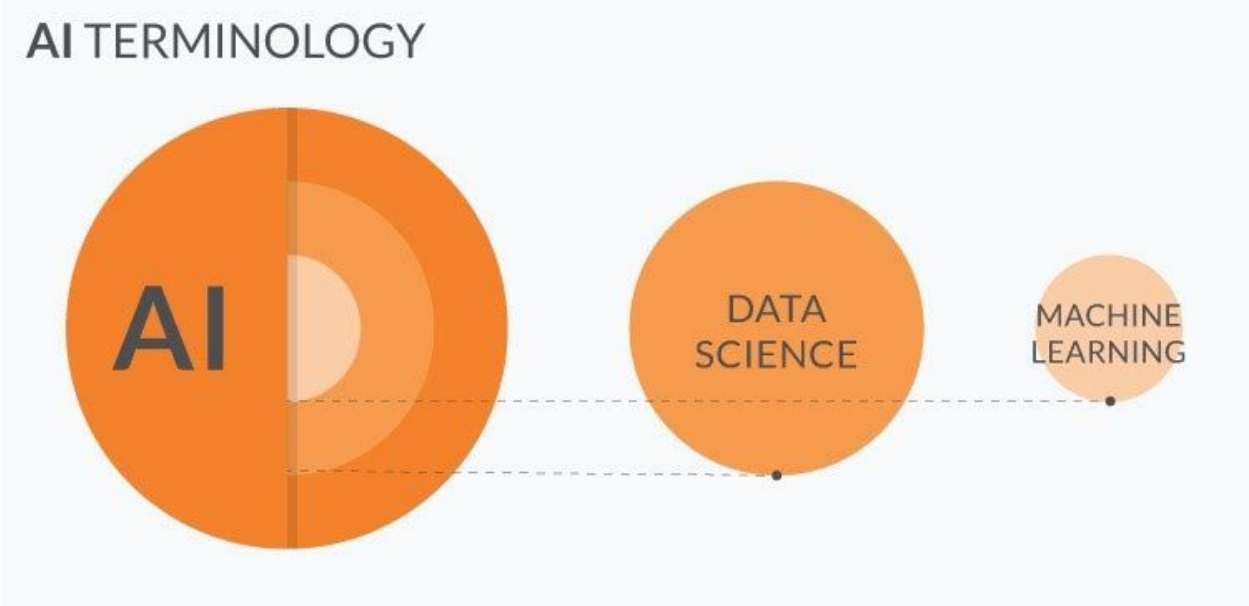
https://towardsdatascience.com/machine-learning-in-finance-why-what-how-d524a2357b56

NOTES:

Def: Machine Learning

- A subset of data science that uses statistical models to draw insights and make predictions.
- The magic about ML solutions is that they learn from experience w/o explicitly being programmed.
- To put it simply, you need to select the models and feed them with data.
- The model then automatically adjusts its parameters to improve outcomes.

NOTE: Data scientists train machine learning models with existing datasets and then apply well-trained models to real-life situations.



The model runs as a background process and provides results automatically based on how it was trained. Data scientists can retrain models as frequently as required to keep them up-to-date and effective.

More Data => More accuracy for results.

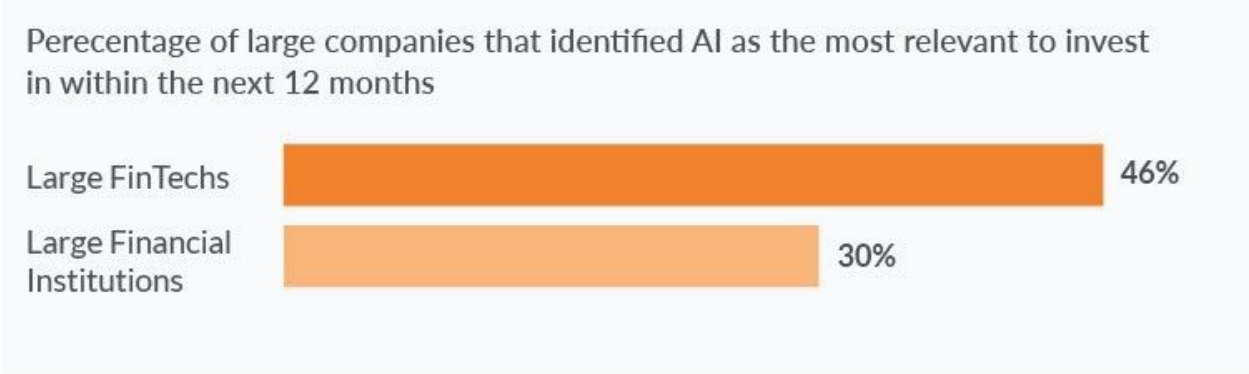
MOST FINANCIAL SERVICES COMPANIES:

- Not ready to extract real value from technology for reasons:

1) Businesses often have unrealistic expectations towards ML and value for organizations.
2) R&D in ML is costly.
3) The shortage of DS/ML engineers is another major concern.
4) Financial incumbents are not agile enough when it comes to updating data infrastructure.

Why ML in finance?

1) Reduced operational costs thanks to process automation.
2) Increased revenues thanks to better productivity and enhanced user experiences.
3) Better compliance and reinforced security.



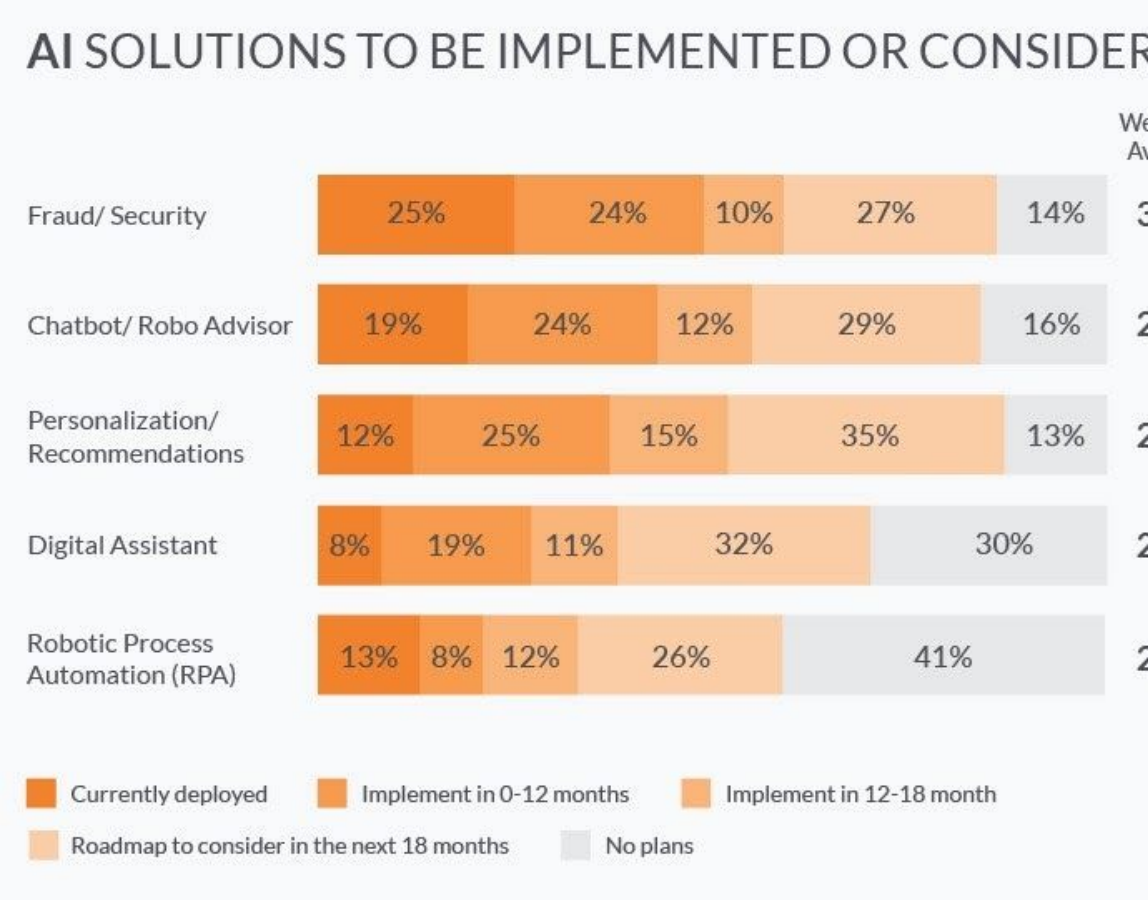
Machine Learning Use Cases in Finance:

1) **Process Automation**
   - Replaces manual work, automates repetitive tasks, and increases productivity.
   - Optimizes costs, improves customer experiences, and scales up services.
     - EX: Chatbots, call-center automation, paperwork automation, and gamification of employee training, and more.

   EX:
   JPMorgan Chase - processes legal documents and extracts essential data from them.
   Wells Fargo - uses AI-driven chatbot through FB Messenger platform to communicate with users and provide assistance with passwords and accounts.

2) **Security**
   - Threats in finance increasing along with growing number of transactions, users, and third-party integrations.
   - Excellent for detecting frauds.
   - If the system identifies **suspicious account behavior**, it can request additional identification from the user to validate the transaction. Or even block the transaction altogether, if there is at least 95% probability of it being a fraud.

- **Financial monitoring** - another security case by which data scientists can train the system to detect a large number of micropayments and flag such money laundering techniques as smurfing.
- Enhances **network security**, through training a system to spot and isolate cyber threats.



3) **Underwriting and credit scoring**
   - ML algorithms fit perfectly with the underwriting tasks that are so common in finance and insurance.
   - Data scientists train models on thousands of customer profiles with hundreds of data entries for each customer (system can be used to perform underwriting and credit-scoring tasks).
     - EX: Destacame produces a credit score for customer and sends the result to the bank, based off bill payment behavior.

4) **Algorithmic Trading**
   - ML helps to make better trading decisions.
   - Mathematical model monitors news and trade results in real-time and detects patterns that can force stock prices to go up or down.
   - Then, it can proactively sell, hold, or buy stocks according to its own predictions.
   - Can analyze thousands of data sources simultaneously, something that human traders cannot possibly achieve.

5) **Robo-advisory**
   - **Portfolio management** - an online wealth management service that uses algorithms and statistics to allocate, manage, and optimize clients' assets. Then, a robo-advisor allocates the currents assets across investment opportunities based on the risk preferences and the desired goals.
   - **Recommendation of financial products** - Many online insurance services use robo-advisors to recommend personalized insurance plans to a particular user (recommender systems).
   - Customers choose robo-advisors over personal financial advisors due to **lower fees**, as well as personalized and calibrated recommendations.