MODEL DEPLOYMENT

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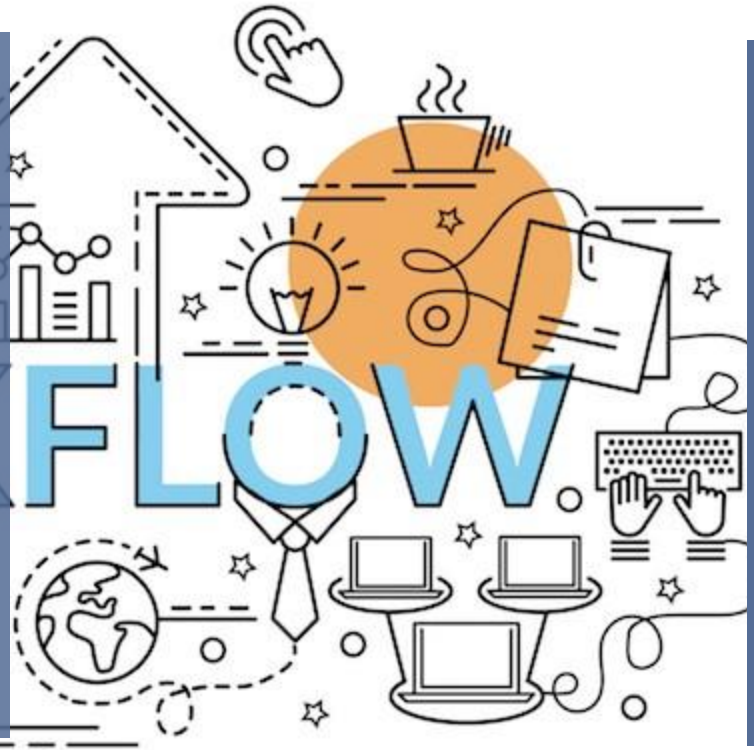
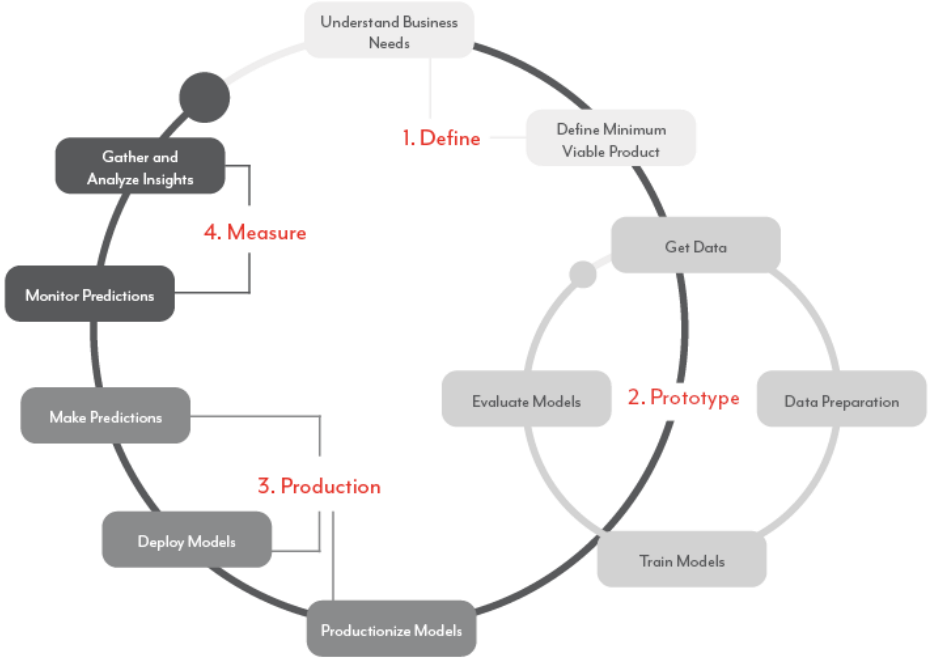
Practice Case Model Deployment



MACHINE LEARNING WORKFLOW



(source: https://www.nextlytics.com/blog/machine-learning-workflow)

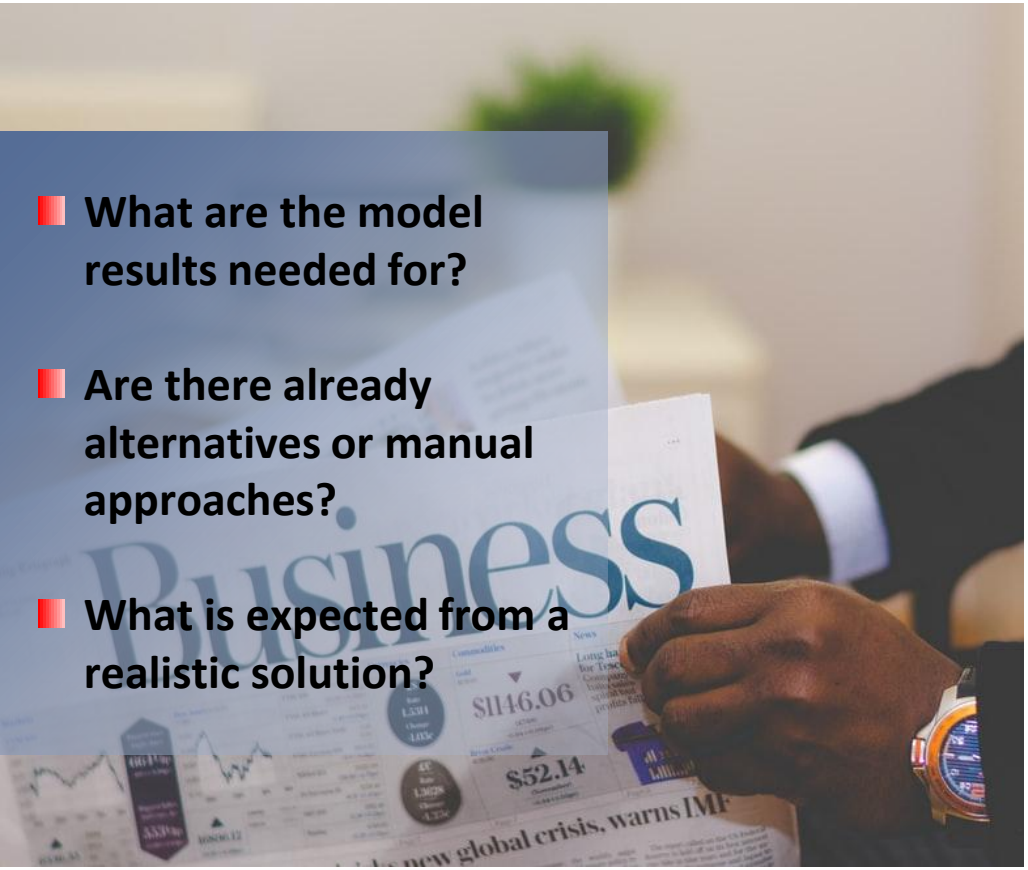
The Machine Learning Workflow can be divided into **four phases.** It should be noted that the "Prototype" phase itself is an iterative process.

1. **Define :** Understand business problem and define goals
2. **Prototype:** Demonstrate the feasibility of a model approach.
3. **Production:** Deployment in the production environment
4. **Measure:** Measure, monitor and control the application.

LET'S DIVE INTO IT !

DEFINE

01



- **What are the model results needed for?**
- **Are there already alternatives or manual approaches?**
- **What is expected from a realistic solution?**

Define

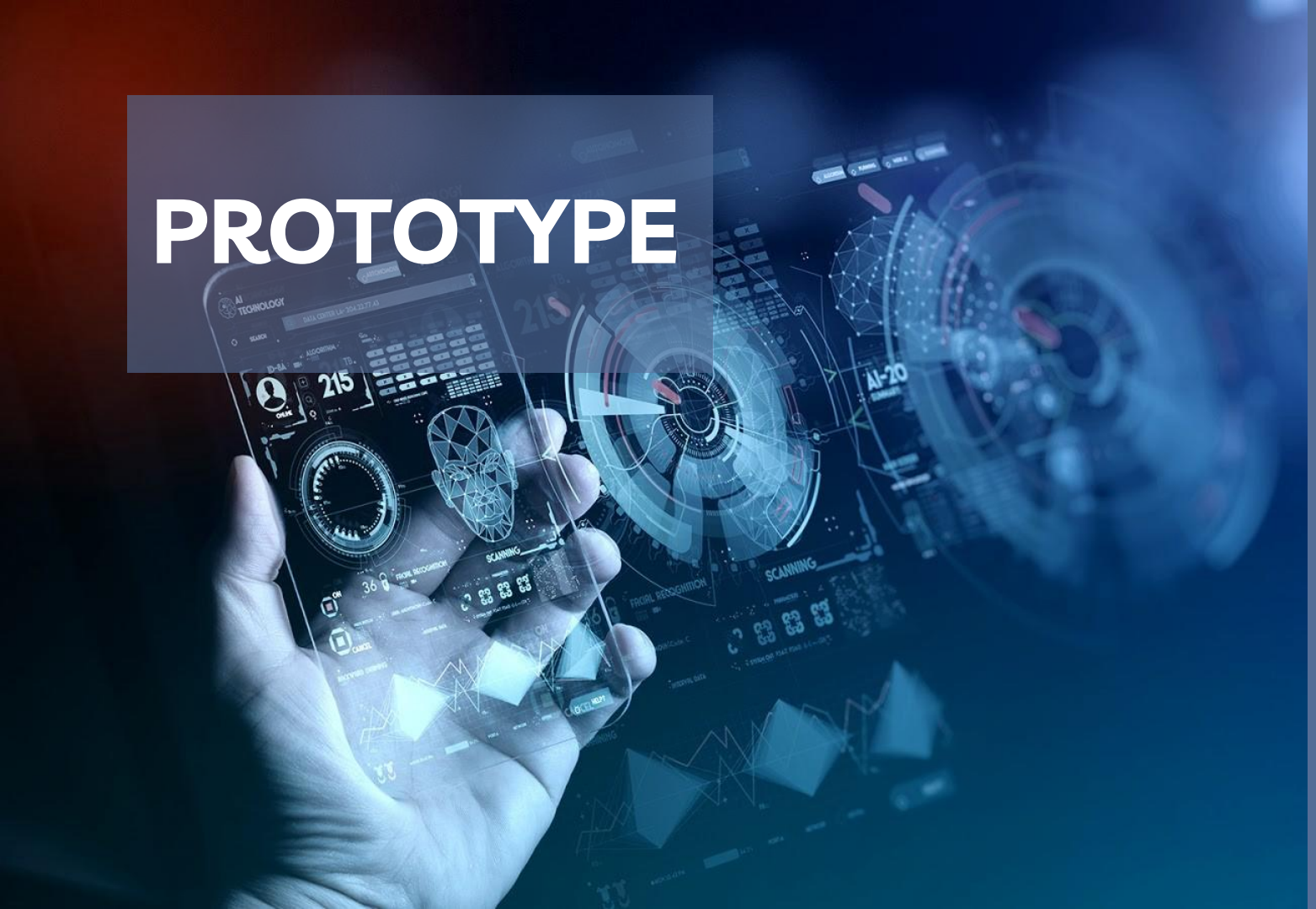
✓ **Understand Businees Needs**

The first phase focuses on the business problem to be addressed. It is about considering the issue in an overarching manner and involving all team members.

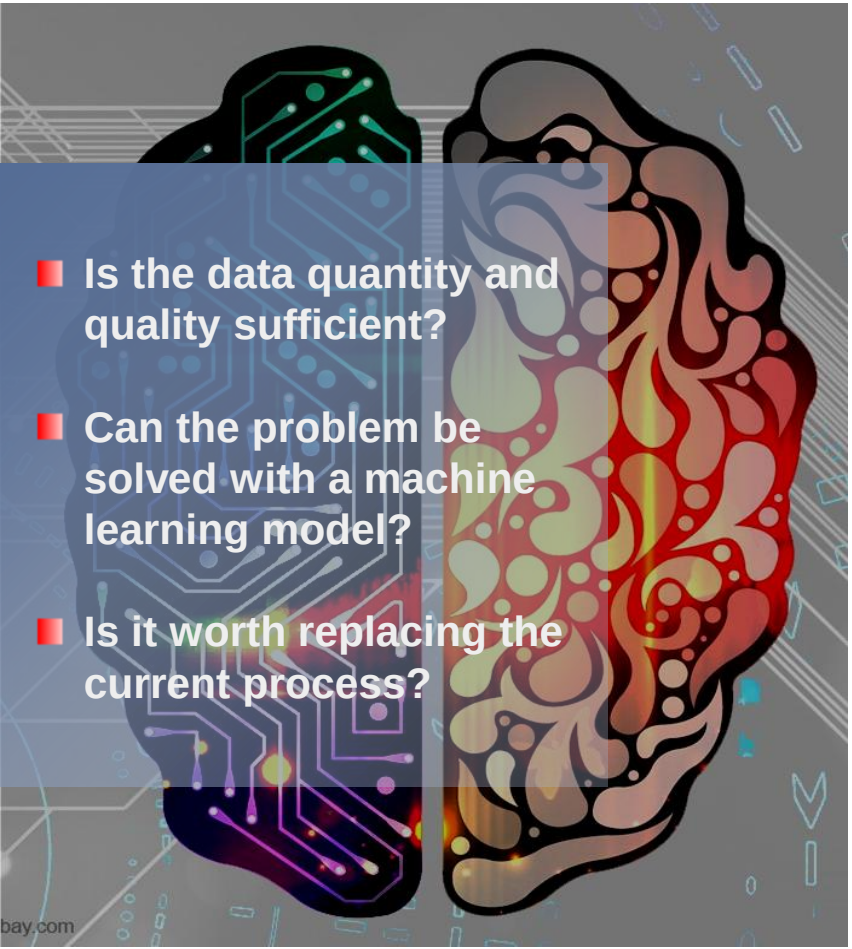
✓ **Define Viable Minimum Product**

Defining the project expectation and defining the deliverables is done once a common understanding of the initial situation is established. The basic form of the solution (e.g., real-time application) and the model type becomes apparent, while the details are deliberately left open.

PROTOTYPE



02



Prototype

Proof of concept is the matter of the second phase. Key activities are data acquisition, preparation for the analysis, and a first model selection.

- ✓ Get Data
- ✓ Data Preparation
- ✓ Train Model
- ✓ Evaluate Model

As soon as the model design meets the requirements, it is possible to move on to the next phase since the model will be optimized iteratively later on anyway.

DATA PREPARATION

DATA EXTRACTION

Typically retrieval of data from unstructured sources.

DATA PROFILING

Most machine learning models fail to work when the datasets are imbalanced and not well-profiled.

DATA CLEANSING

Ensures data is clean, comprehensive, error-free with accurate information as it helps in detecting outliers.

DATA TRANSFORMATION

Data transformation helps in standardizing and normalizing.

DATA ANONYMIZATION

Process of removing or encrypting personal information from the datasets to protect privacy.

DATA AUGMENTATION

Used to diversify the data available for your training models.

DATA SAMPLING

Identify representative subsets from large datasets to analyze and manipulate data.

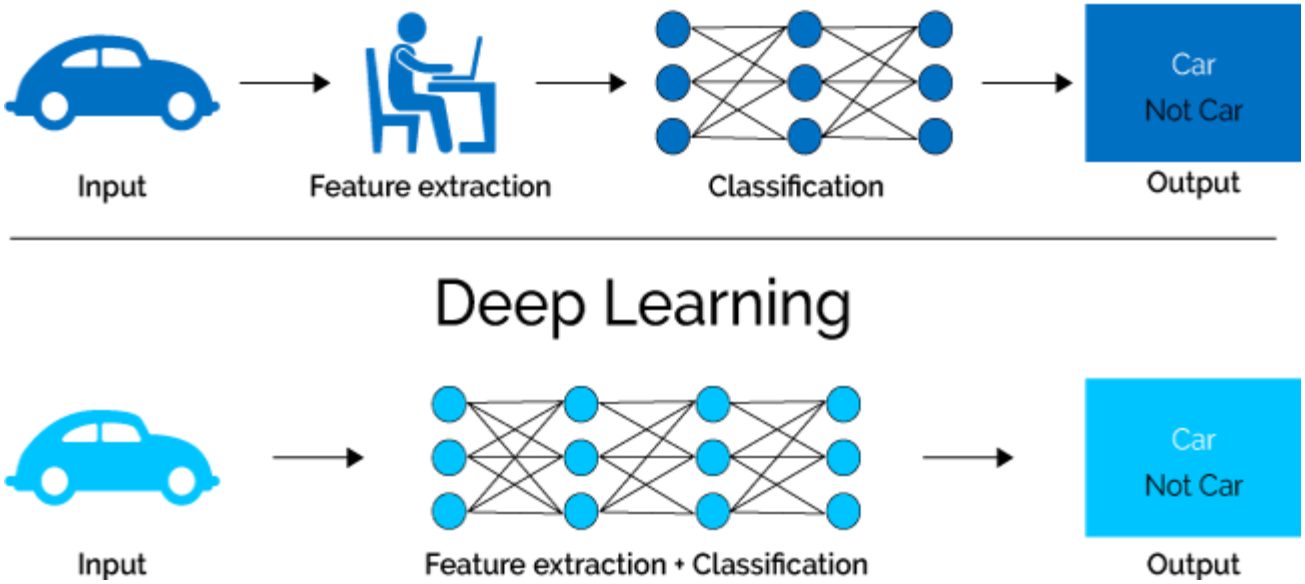
FEATURE ENGINEERING

Major determinant of classifying a machine learning model as a good or a bad model.

DATA LABELLING

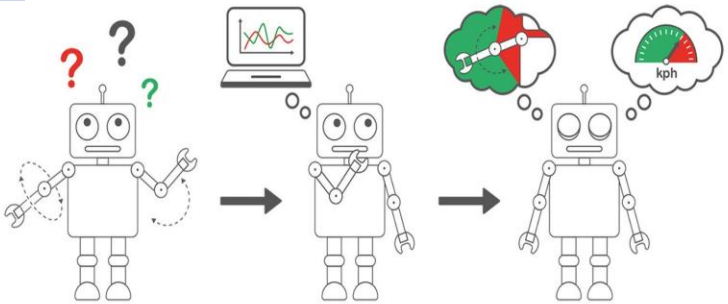
Simply assigning tags to a set of unlabeled data to make it more identifiable for predictive analysis.

TRAIN AND TEST MODEL



Feed-Forward Propagation and Back Propagation

The training stages consist of feed-forward propagation and back propagation processes. Feed-forward propagation is an algorithm that only calculates the output of the input (feed forward) so that there is no feedback to the input, while back propagation is an algorithm for training (adjusting weights) which consists of feed-forward (feed-forward propagation) and feedback (feed-forward propagation). Back propagation) to calculate the error/loss. The back propagation process is carried out repeatedly to get the smallest error/loss value so that it is expected that the detection accuracy will be better. While the **test model** is only feedforward process.



EVALUATE MODEL

- How well our model is performing ?
- Is our model accurate enough to put into production ?
- Will a larger training set improve my model's performance ?
- Is my model under-fitting or over-fitting ?

PRODUCTION

MACHINE LEARNING

Image hosted by: WittySparks.com | Image source: Pixabay.com

03

PRODUCTION

PRODUCTIONIZE MODELS

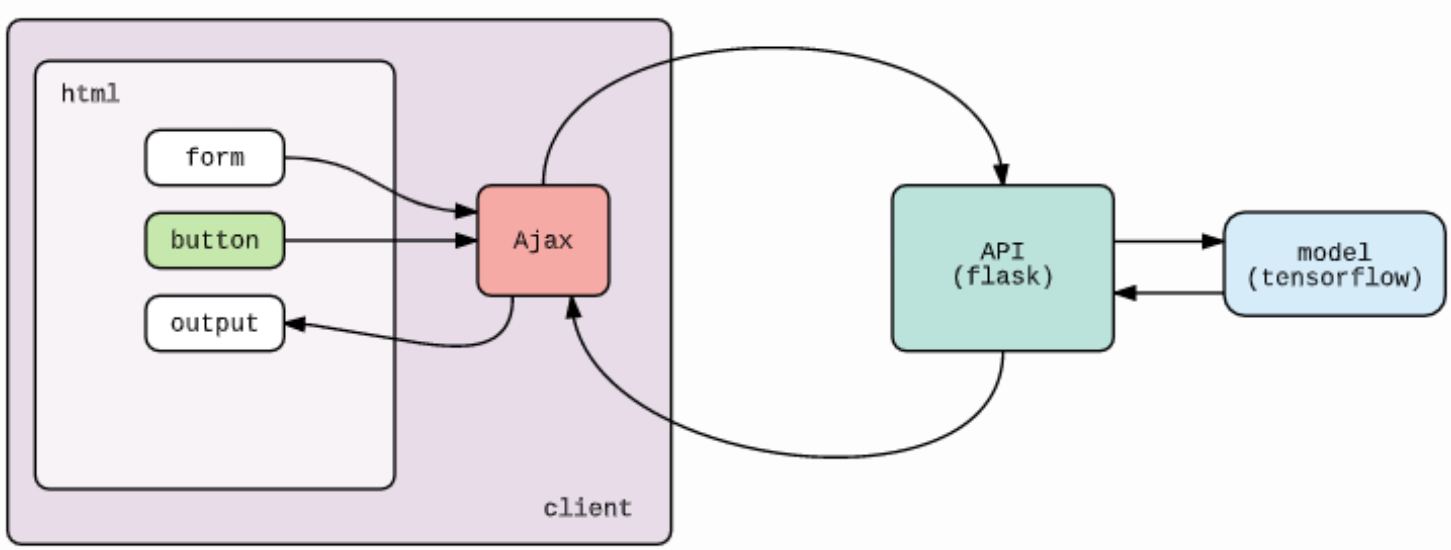
DEPLOY MODELS

MAKE PREDICTIONS

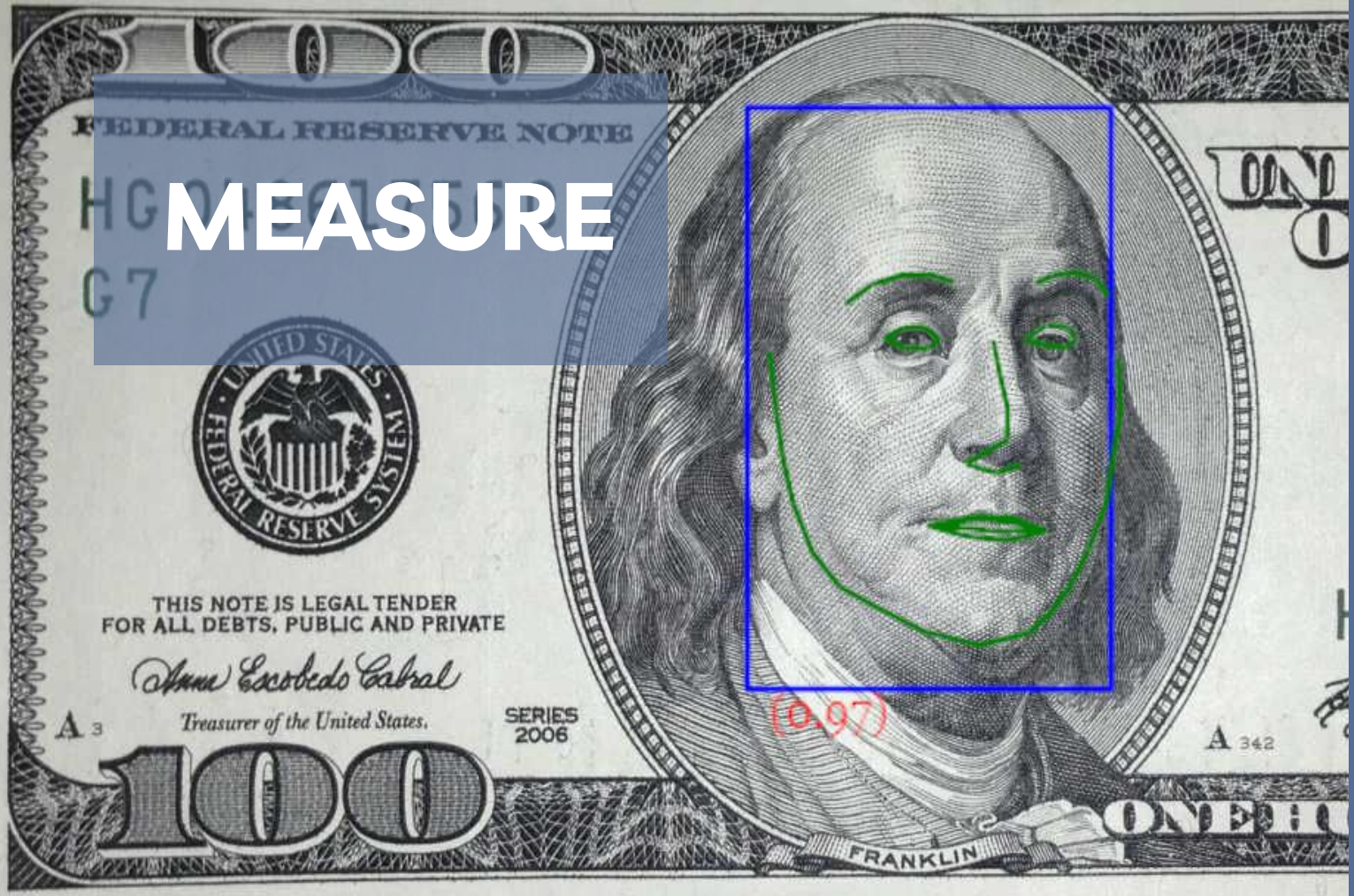
In the transition to the Production phase, the decision is made for or against the Machine Learning approach. If the model proves to be promising, it can be transferred to a production environment.

At the end of the production deployment, the model is ready for use under realistic conditions. Often, the deployment of the model is accompanied by a change of responsibilities. Especially with innovative approaches in model design, problems arise during the handover. MLOps provides important structures for collaboration between data scientists and operational experts.

EXAMPLE



Application Programming Interface (API) is a software intermediary that allows two applications to talk to each other. Flask to build the **API** (back-end) from python, and jquery.ajax to handle requests to the API from your **client** (front-end) - for instance github pages.
(scr: https://guillaumegenthial.github.io/serving.html)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MEASURE

04

Measure

The fourth phase ensures that your project delivers sustainable added value for your company. To do this, the performance of the model is monitored during regular operation. In the highly agile world, many changes occur that negatively impact the model's quality of results.

The assumptions of the model must also be reviewed. If they are still valid, a retraining of the model with further fresh data can grant a performance boost. In case of profound changes, a structural adjustment of the model or the addition of a new data source will be necessary.

THANKS