# Machine Learning

# Scoping and Feasibility

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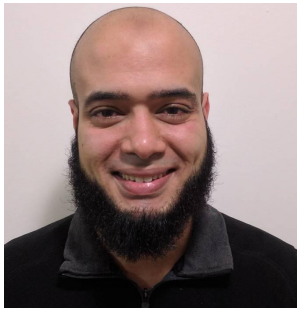

# Scoping and Feasibility

- Software **scoping** is the process of understanding the underlying business need and specifying a list of specific project goals, deliverables, tasks, costs and deadlines
  - Developed by the **project team**, often in consultation with the client
  - It involves determining what is **included** in the project and what is **out of its scope**.
  - Addresses how the **customer requirements** will be fulfilled
  - Carefully documented
- **Feasibility** is about the possibility of something being accomplished
- In ML Context, scoping starts with clearly **defining the problem**(s) that will satisfy the business needs

# Question!

- What is the difference between these 2 given business requests:

- 1) Honda is asking for an ML module that determines if the driver **hand is on the wheel**

- 2) Toyota is asking for software AI features to add into a car's in-cabinet systems to improve both the **driving experience and safety**

# Identifying the problems

- What are the possible ML features for cars **in-cabinet** systems for driving experience and safety?
- Driver Assistance & Safety
  - **Driver Monitoring**: monitor driver attentiveness (drowsiness or distraction), HOW
  - **Passengers Monitoring**: child monitoring (on seat / seat bilt)
  - **Gesture Control**: music, air conditioning, and navigation through hand gestures
  - **Adaptive Cruise Control**: based on driving conditions and behavior of other cars
  - **Emergency Response**: Detect collision and automatically contact emergency services
  - **Parking Assistance**: finding a parking spot / auto-parking
  - **Personalized Experience**: driver preferences for seating, climate control and music
  - **Automated Entry**: keyless entry
  - **Object Detection**: Alert for left Mobile / Key

# Scoping

- As you see, there could be many problems to solve!
- We need to carefully select the problems we will work on
- You need to ask and investigate several points about each problem
  - **Data**: All concerns we learned (data size, quality, labels quality, imbalance, etc)
  - **Technical Constraints**: Are there limitations on the model's size, inference speed?
  - **Maintenance**: How frequently does it need to be updated? Who will own it?
  - **Timeline**: How long do you expect the project to take?
  - **Budget & Resources**: Money? Team size? hardware and software?
  - **Business Metrics**: What are the needed metrics

# Feasibility

- Now, we know the problems and customer needs
- Can we do it?
  - **Technical Feasibility**: Current ML capabilities can do it? Achieve these business KPIs?
    - Is it an ML problem? Given data, can human solve it?
    - Do we have predictive features?
    - You may prepare POC first before finalizing KPIs
    - Utilize recent research progress on similar topics
  - **Resource Feasibility**: available resources enough for the project / within timeline
  - **Data Feasibility**: Is enough quality data available? If not, can it be collected within time and budget constraints?
  - **Scalability**: Assess if the solution will scale effectively, both in terms of data size and model complexity.
  - **Competitive Analysis**: Look at existing solutions to the problem. How will your project differ and improve upon them?

# Your Turn: Define possible ML problems

- Ecommerce retailer is asking for using ML to increase the revenue
- **Customer Experience**
  - **Recommendation Systems**: better personalization (user behavior, preferences)
  - **Search Engine (**relevant results) / **Chatbots**: handle more queries
- **Marketing**
  - **Customer Segmentation**: personalized marketing strategie per segment
  - **Churn Prediction**: proactive steps to retain these customers
  - **Email Marketing**: Find best time to send emails / to whom / which content
  - **Dynamic Pricing**: based on various factors like demand, supply, competitor prices
- **Sales Forecasting**: Demand Forecasting / Market Analysis / Promotion Effectiveness
- **Operations**: Fraud Detection / Inventory Management / Optimized Shipping / Quality Control
- **User Behavior**: Sentiment Analysis, Click-Through Rate Prediction, Behavioral Email Targeting

# Relevant Materials

- Andrew NG - MlOps

"Acquire knowledge and impart it to the people."

"Seek knowledge from the Cradle to the Grave."