Data2Motion. Image Capstone Project

Description	Suppose you work as a Data Scientist in an automotive company that wants to develop a system for detecting drowsiness through images of a driver's face. To simplify the problem, drowsiness is detected when both eyes of the driver are closed for a period of 3 seconds.
Goal(s)	How do we extract the driver's eyes area of an image? How do we determine that the eyes are closed? 1. We have a public dataset with images of closed and open eyes. 2. How do we determine that a driver's eyes are closed for 3 seconds?

Hints	For this Capstone we will use two databases: one with images of open and closed eyes and one with images of faces and eye annotations.
	
	 1. We will create a first object detection model. The objective of this model is to extract the eyes (region of interest) from images of faces.
	
	 2. We will develop a second model which consists in the creation of an eye classifier. Each eye will be classified between open or closed.
	
	 3. Once the models are trained, we will create a flow to read a video or from our web cam and test the models.
	
	     a. We will have to create a video of our face closing one or two eyes, another option would be to read in real time from our web cam.
	
	     b. The information from the video or webcam will be processed in frames. This way we will have about 30 frames per second.
	
	     c. Create a publisher or data provider, to upload the frames to kafka.
	
	     d. Create a kafka consumer process to handle the data Kafka will allow you to send messages between applications using the publish/subscribe messaging pattern.
	
	     e. The publisher will send to the customer feedback information directly to the kafka server (also called a broker), keep in mind how you handle the order and partitioning of the messages.

	f. Then, the consumer(s) will subscribe to one or more topics to receive the messages and process them with opencv to extract the eyes and process the images extracted from the eyes.
	
	4. Read data from Kafka and process the images.
	
	   a. Receive data from kafka
	
	     Read from kafka last 3 seconds of images (about 90 frames). Maybe we could reduce the number of frames by selecting only some of them without losing acurance).
	
	   b. Process each frame to extract the eyes using opencv and process the image (scaling, normalization, dimensions...)
	
	   c. Determine if both eyes are open or closed during the last 3 seconds.
	
	   d. If both eyes are closed for 3 seconds, trigger an alarm.

Dataset	The images will be provided in a zip file, with two folders: test and train. For the eye classifier the folders will be divided into two subfolders: closed and open. For each image of the eye detection model there will be a txt file with the annotations.
Infrastructure	As part of the challenge, identify the infra you'll need and ask to the Capstone Tutor for its availability.
Deliverable	You should design a Data Story Telling about your approach to the problem, your initial perceptions of the data and the work done on it, the techniques and libraries used, your decisions on the appropriate models selected and the interpretation of their results. The code submitted should trigger an alarm when the individual closes their eyes for a period of 3 seconds. Format: Powerpoint