

# IMAGING FOR ANPR

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## INTRODUCTION

The engine will recognize license plates with Latin characters (English letters and numbers) in one row.

To achieve the best result based on the ANPR engine, the recommended usage is to identify the vehicle based on not one but several images. Having more images from different angles from the same car offer the possibility to compare the results and select the final plate number accordingly. The sample program gives an example for this method (video stream input part).

Image analytics like OCR needs certain computing resources. The sample program will might give different results when tested on different hardware.

The image that is loaded into the ANPR engine can be provided by an image source of any kind. It could be supplied by either a digitized analog signal or by a digital camera. However, what is more important that not all images are usable for ANPR (Automatic Number Plate Recognition). In fact ANPR in general require a set of specific criteria to be met when it comes to images. Thankfully, these criteria can be well defined. This guide will present what these criteria are and will also discuss them in detail.

In general when discussing ANPR systems, the phrase “good quality images” refers to the fact that the images used meet the criteria detailed in this document.

## 1. GOOD CONTRAST

In order to be able to differentiate the character from the background, there has to be a certain contrast between the two. The criteria for this is not for high contrast, but rather, a consecutive average difference. Of course, the higher the contrast the better, but having low dispersion in contrast ratio (minimal blur on the edges) is more important.



Figure 1: An image with good contrast. The characters on the license plate are clear. ✓



Figure 2: An overexposed image on which the license plate is barely visible. ✗

## 2. SHARP IMAGE

Having adequately sharp images is also crucial. If one cannot read the characters properly and easily, there is a low probability that the engine will recognize the license plate. It is also worth noting that blurring can be caused by many other factors and not just small image size.



Figure 3: An adequately sharp image. ✓

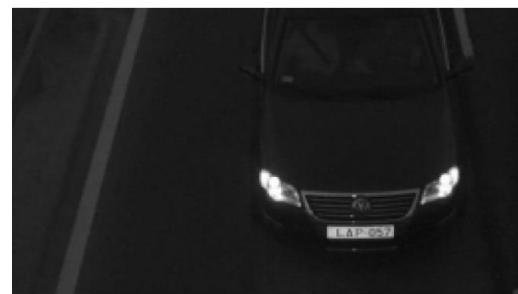


Figure 4: A blurry image with a hard to read license plate. ✗

### 3. CHARACTER SIZE AND RESOLUTION

Optimal size of characters on the given image is essential. In terms of character size there is one typical misconception. Many think that the higher the resolution, the better. This statement however, is not true. Neither images with too high or too low resolution will work properly.

#### 3.1. HIGH RESOLUTION

High-resolution (macro) images contain a lot of redundant data. Characters can be easily defined based on the edges of a character. No other information is needed. So much so, that the pixels within a character are irrelevant in terms of shape/pattern recognition. These are just pixels that waste the resources of computation. Therefore, resolution is optimized for a certain character size. Although this size can be adjusted, it has to be noted that adjusting the default character size can cause problems if characters are too tall.



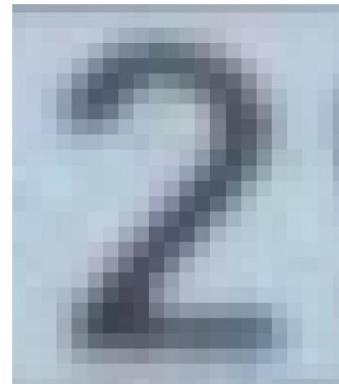
A good image with adequate resolution, not too high, not too low. ✓

#### 3.2. LOW RESOLUTION

Images containing less information than what the engine needs should be considered as low resolution images. Of course, it has to be noted that even if the characters are smaller in resolution than the required minimum, the engine may deliver correct results, but it will not consistently recognize these images. If one would feed the engine a few thousand low resolution images, the recognition rate would drop over time.

### 3.3. MINIMUM AND OPTIMAL CHARACTER SIZE

The optimal size of a character for an ANPR task is at least 20 pixels in height for Latin characters.



Optimal character size with optimal resolution for OCR:  
HD image. ✓

The characters can of course be taller (and will be if higher resolution cameras are used), the 20 pixel height is just the minimum value. But do note that if the character height is less than 20 pixels, then the recognition rate will drop drastically. The same is true if the characters are too high. At around 40-50 pixels, the recognition will again drop and sooner or later will reach 0%.

## 4. LOW DISTORTION

The camera which acts as the image source for OCR can be installed in many ways. There exist multiple installation positions that can help in providing optimal images with minimal distortion. However, there are many cases when the camera cannot be installed in these position causing the object (license plate) to become distorted on the image. This is why the OCR engine was built to tolerate a 25°-30° angle. However, if the pan or tilt angles of the camera exceed 25°, distortion may significantly reduce recognition and performance rate.

## 5. EXAMPLES TO VOID (NOT OPTIMAL FOR ANPR)



LOW SPATIAL RESOLUTION



LOW CONTRAST



HIGH DISTORTION



BLURRED IMAGE



OVEREXPOSURE



BAD LIGHTING CONDITIONS  
(SHADOW AND STRONG LIGHT)