Sviluppo Di App Mobile Per Augmented Reality

Manuela Chessa
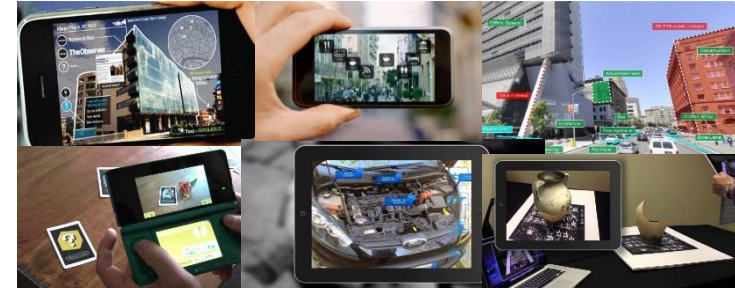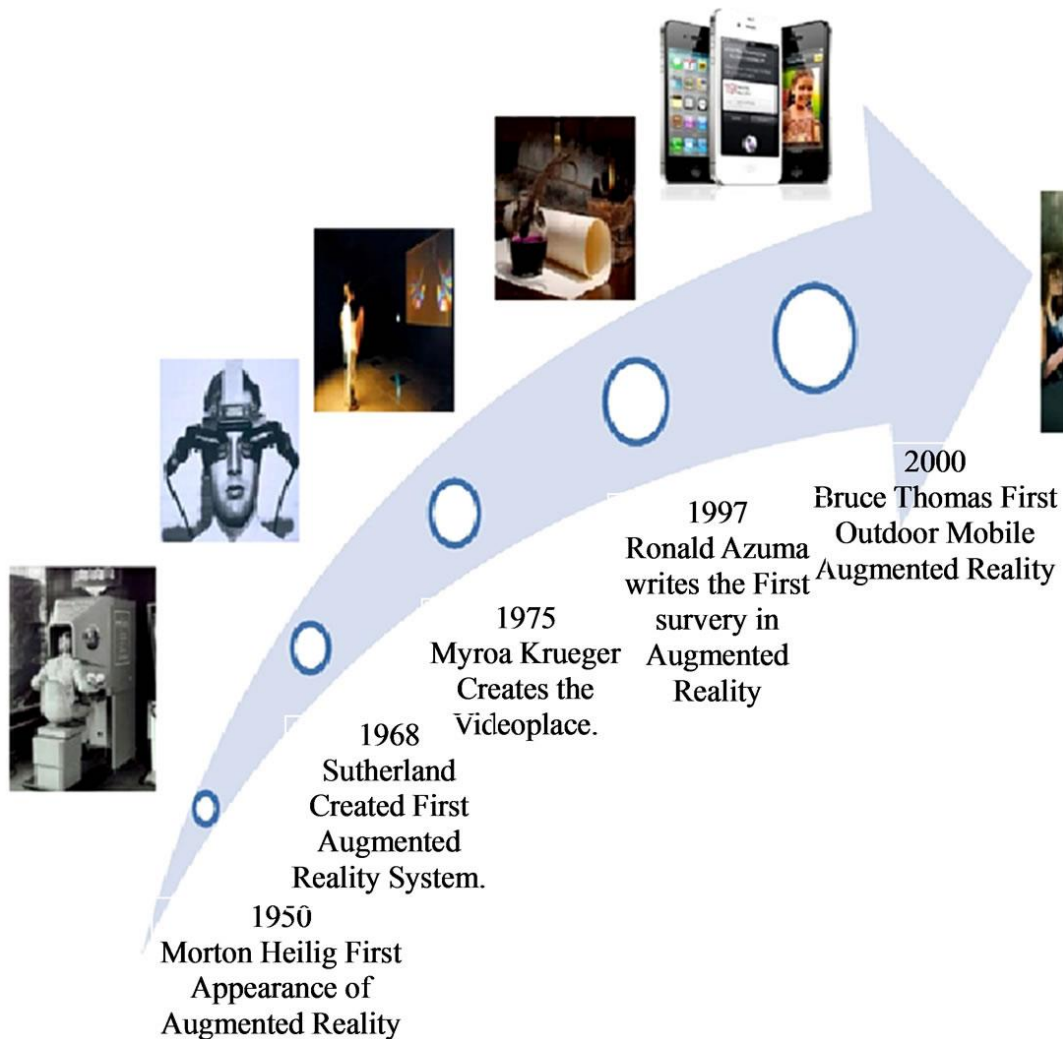
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A brief history

1950
Morton Heilig First
Appearance of
Augmented Reality

1968
Sutherland
Created First
Augmented
Reality System.

1975
Myroa Krueger
Creates the
Videoplace.

1997
Ronald Azuma
writes the First
survery in
Augmented
Reality

2000
Bruce Thomas First
Outdoor Mobile
Augmented Reality

TODAY

A. Alkhamisi and M. Monowar, "Rise of Augmented Reality: Current and Future Application Areas," International Journal of Internet and Distributed Systems, Vol. 1 No. 4, 2013, pp. 25-34. doi: 10.4236/ijids.2013.14005.

VirtualReality headsets (HMD): examples

MOBILE!

VirtualReality software
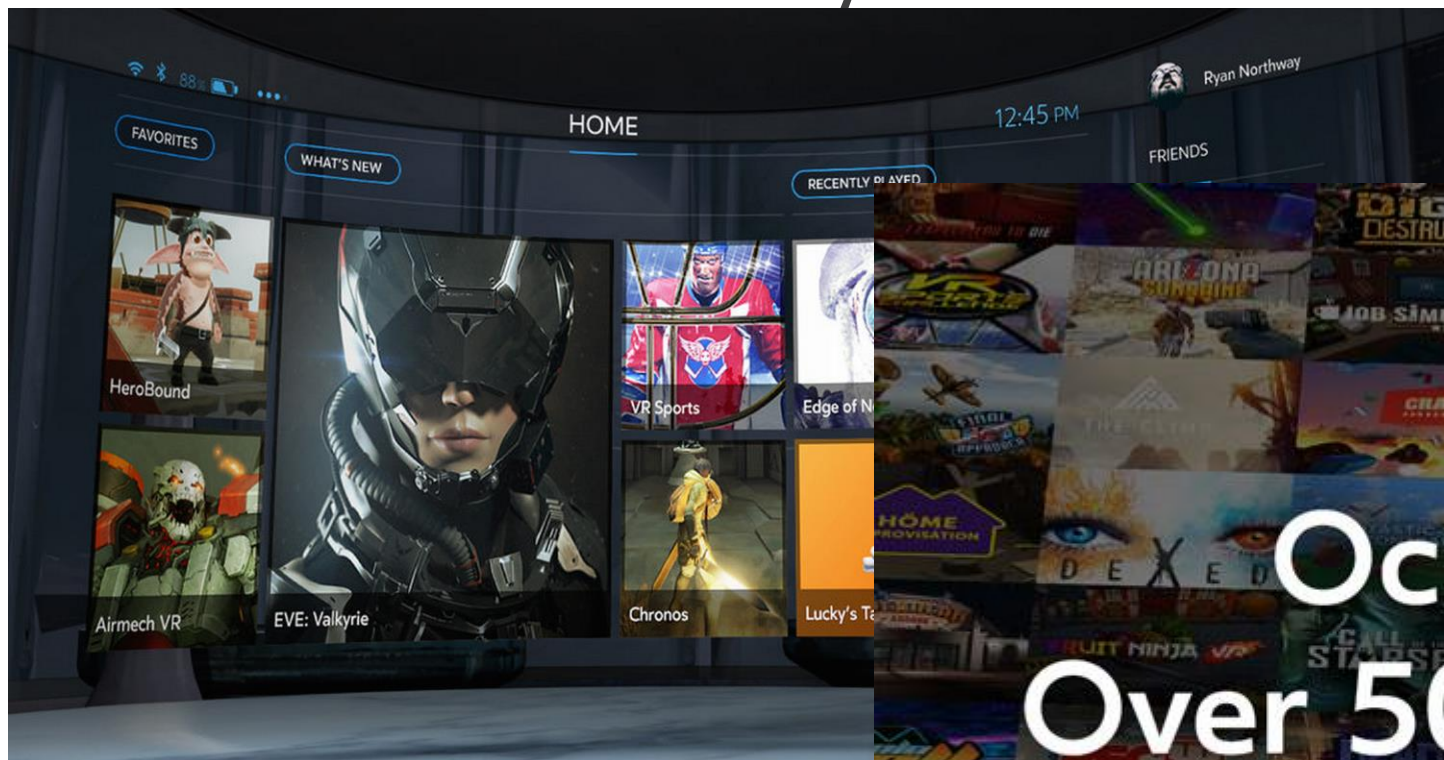
Augmented Reality (mobile only)
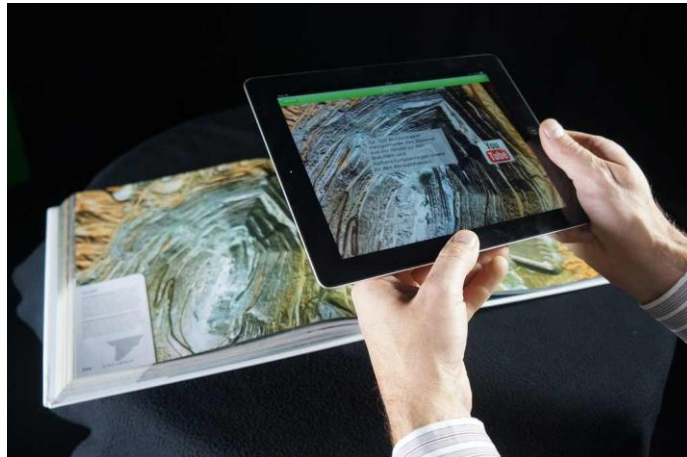
Today…

We will learn together how to develop a simple, yet working, AR app on a mobile device (a phone).

What we will need:

1. Unity 3D Game Engine

2. Vuforia SDK

3. A Samsung S6

Unity 3D game Engine

Unity3D is a powerful cross-platform 3D engine and a user friendly development environment.

https://unity3d.com/ Free for beginners and students

Scripting: multiple scripts can be attached to a single object, allowing for easy code reuse. Unity supports three different programming languages; UnityScript, C#, and Boo. UnityScript is similar to JavaScript and ActionScript, **C# is similar to Java**, and Boo is similar to Python. Depending on your background you may feel more comfortable with one or the other.

Unity 3D game Engine

Assets: they are any resource your game uses (3D models, materials, textures, audio, scripts, fonts,...). Other than a few simple objects such as cubes and spheres, Unity can't actually create most of these assets. Instead, they must be created externally using 3D modeling applications and painting tools and then imported into Unity.

Build and publishing: Application built with Unity can be deployed onto several mobile and not-mobile platform

Unity 3D game Engine
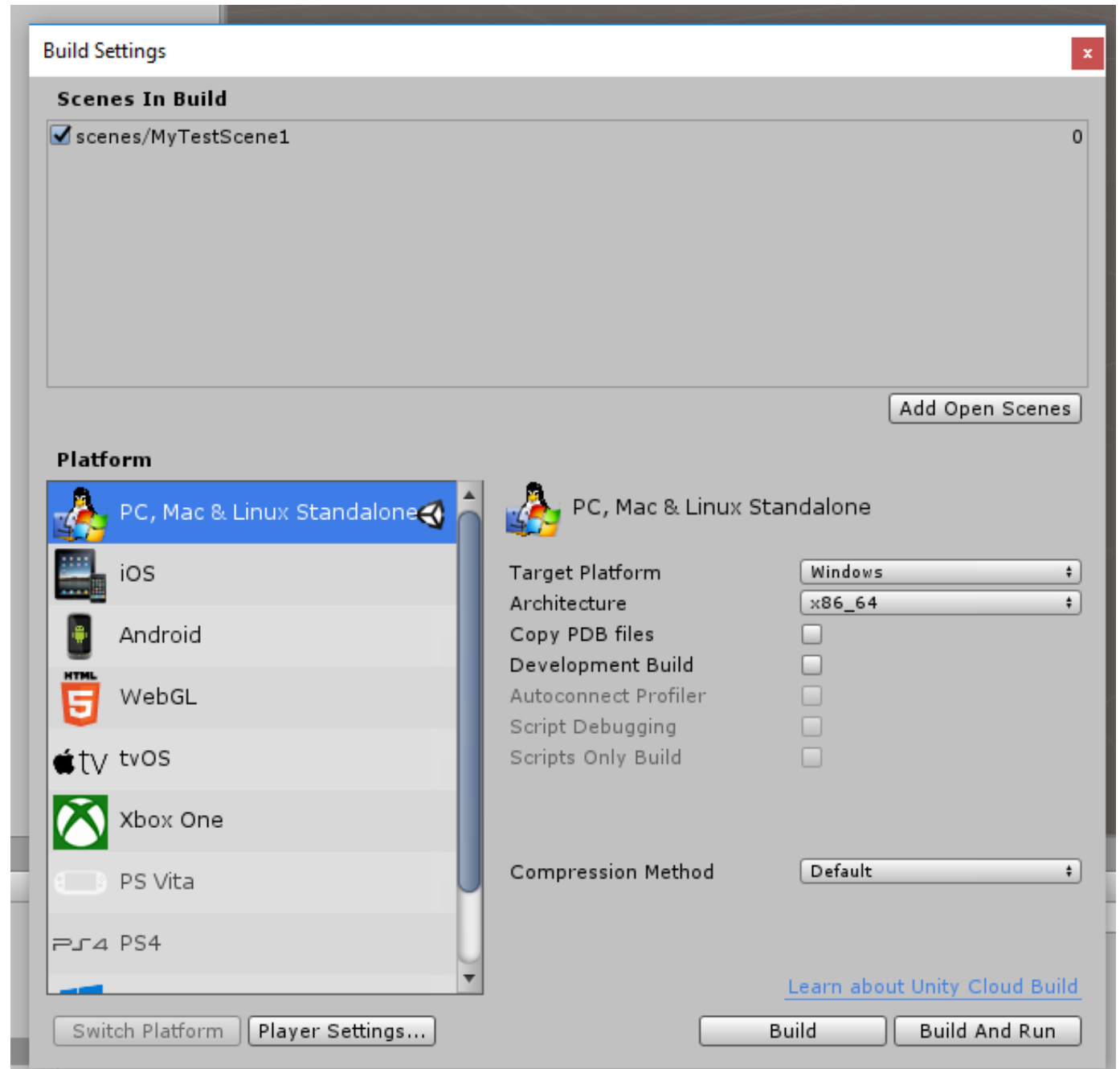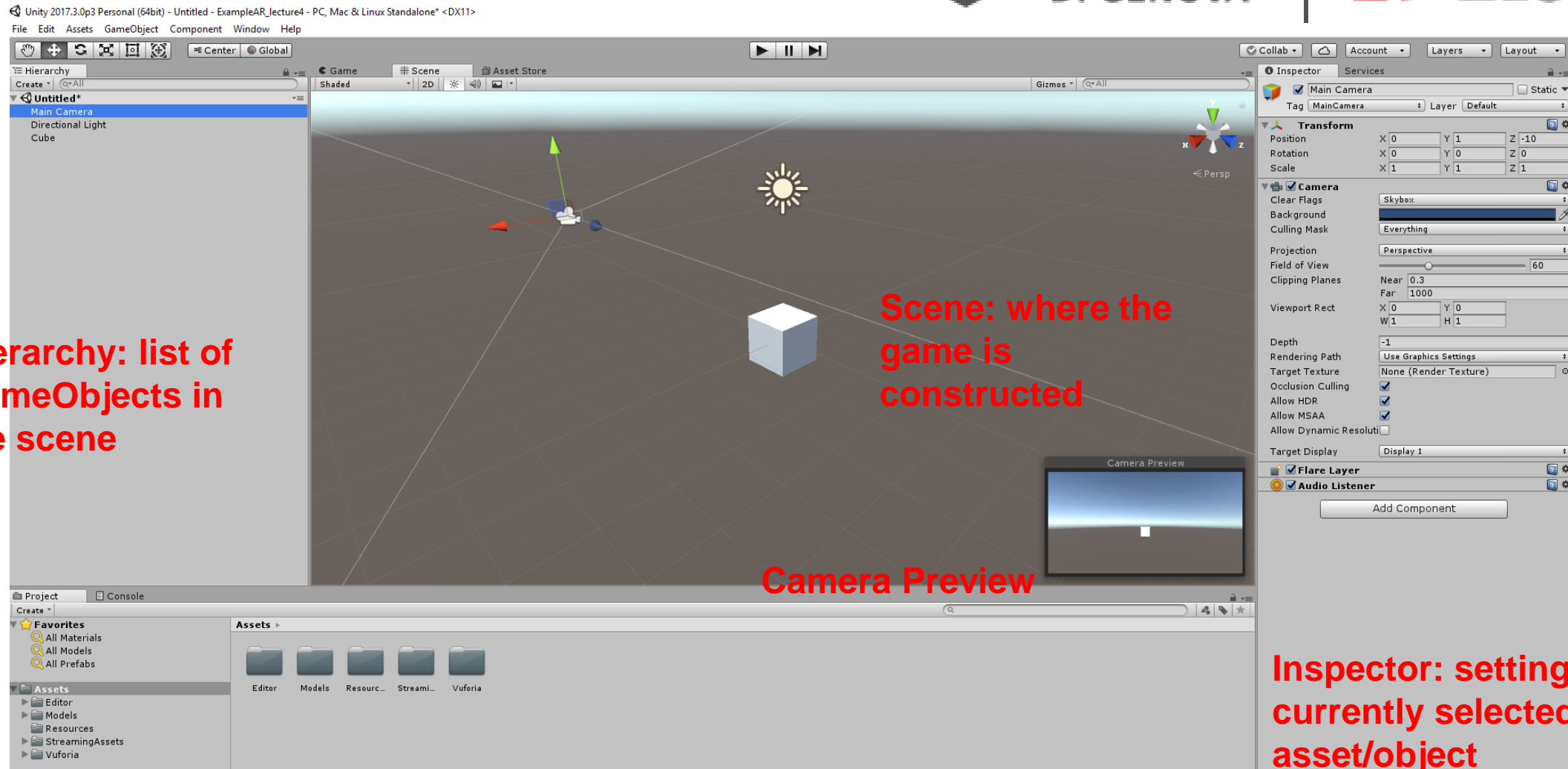
Hierarchy: list of GameObjects in the scene

Scene: where the game is constructed

Camera Preview

Inspector: settings for currently selected asset/object

Project: a list of your project's assets, acts as a library

Unity 3D game Engine

Example: create a simple 3D scene in Unity and deploy onto a mobile phone (Android)

Augmented Reality in Unity3D

Several libraries provide support for developing AR applications:

◦ ARToolkit

◦ Vuforia

◦ ARCore (Google)

◦ ARKit (Apple)

In this course, we will see a brief introduction to Vuforia SDK (https://www.vuforia.com/)

From Unity 2017.2 Vuforia has been integrated into Unity

Apps for phones, tablets, Notebooks, Digital Eyewear

Augmented Reality with Vuforia

Vuforia is a software platform for creating Augmented Reality applications.

Developers can easily add advanced computer vision functionality to any application, allowing it to recognize images and objects, or reconstruct environments in the real world.

One images or 3D objects are recognized, it is possible to put "on them" virtual objects.

Images and objects used to place VR objects into the real world are called "targets".

Computer Vision algorithms that recognize targets and track them.

AR with Vuforia: Image targets

AR with Vuforia: Image targets

Unlike traditional fiducial markers, data matrix codes and QR codes, Image Targets do not need special black and white regions or codes to be recognized.

The SDK detects and tracks the features in the image itself by comparing these features against a known target resource database (features: edges, corners)

Once the Image Target is detected, the SDK will track the image as long as it is at least partially in the camera's field of view.

How To Evaluate a Target Image in Grayscale

Vuforia uses the grayscale version of the target image to identify features that can be used for recognition and tracking.

You can use the grayscale histogram of your image to evaluate its suitability as a target image.
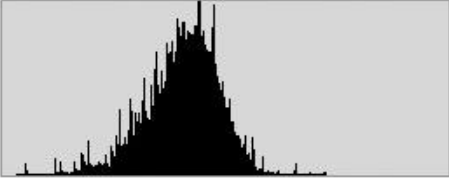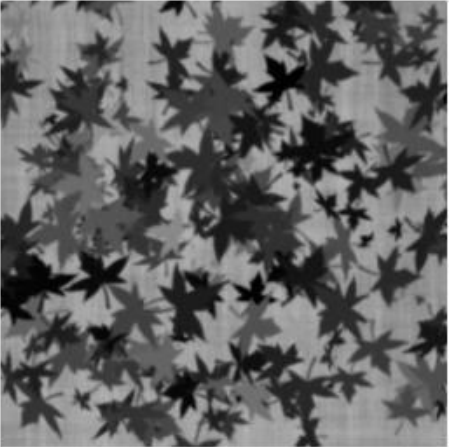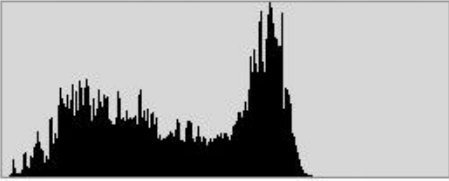
If the image has low overall contrast and the histogram of the image is narrow and spiky, it is not likely to be a good target image. These factors indicate that the image does not present many usable features.

If the histogram is wide and flat, this is a good first indication that the image contains a good distribution of useful features.
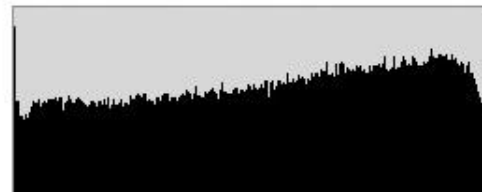
Note though that this is not true in all cases, as demonstrated by the image in last row of the following table.
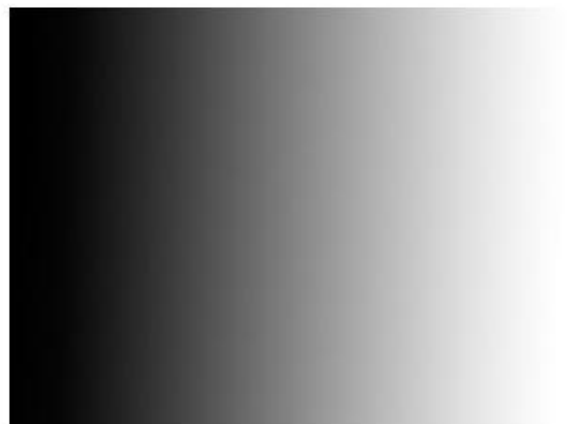
How To Evaluate a Target Image in Grayscale

Uploaded Image in Grayscale	Histogram	Star Rating
		★☆☆☆☆
		★★★☆☆

How To Evaluate a Target Image in Grayscale

How To Evaluate a Target Image in Grayscale

stones3

Edit Name   Remove

Type: Single Image

Status: Active

Target ID: 49685462a37b4ed8b149c6852d062194

Augmentable: ★★★★★
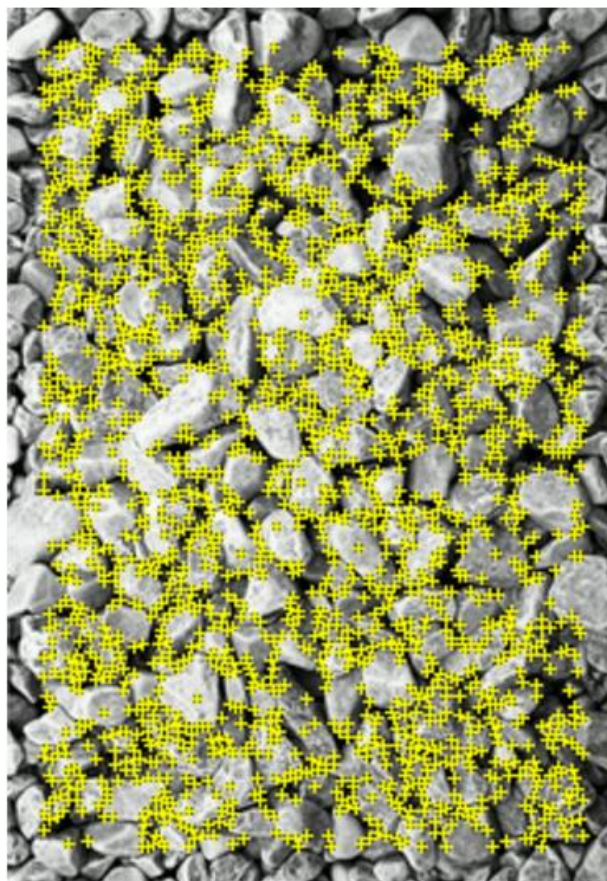
Added: May 11, 2016 11:33

Modified: May 11, 2016 11:33

Update Target   Show Features

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Dibris

How To Evaluate a Target Image in Grayscale

stones3

Edit Name   Remove

Type: Single Image

Status: Active

Target ID: 49685462a37b4ed8b149c6852d062194

Augmentable: ★★★★★

Added: May 11, 2016 11:33

Modified: May 11, 2016 11:33

Update Target   Hide Features

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Build your own Image Targets Database

	L20_pannello	Single Image	★★★★★	Active	Sep 16, 2016 11:14
	Hidalgo_pannello	Single Image	★★★★★	Active	Sep 16, 2016 11:14
	DragoAli_pannello	Single Image	★★★★★	Active	Sep 16, 2016 11:13
	Drago_pannello	Single Image	★★★★★	Active	Sep 16, 2016 11:12
	Dart_pannello	Single Image	★★★★★	Active	Sep 16, 2016 11:11
	G50_pannello	Single Image	★★★★★	Active	Sep 15, 2016 16:40
	Delta28_pannello	Single Image	★★★★★	Active	Sep 15, 2016 16:39
	Barbarina_pannello	Single Image	★★★★☆	Active	Sep 15, 2016 16:38
	SettimoVelo_pannello	Single Image	★★★★★	Active	Sep 15, 2016 16:33
	FC155_pannello	Single Image	★★★★☆	Active	Sep 15, 2016 16:03

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Dibris

AR with Vuforia: an example

Several GameObjects are available. The simplest one are:

ARCamera:
- ◦ defines the database of Image Targets;
- ◦ all the properties of the augmentation and computer vision engine;
- ◦ the target device (in the example none, just show a preview on play with the webcam)

Image Target:
- ◦ Defines a target image (from the database) and its dimension in the real world. The augmentation will be done wrt to this dimension (e.g. if real width is 30 cm, dim 0.5 means 15 cm). Dimension are scaled.
- ◦ Optionally: extended tracking and smart terrain
- ◦ Virtual objects will be child of Image Target.

SEE EXAMPLE!