



# Creating image recognition software to find cracks on smartphones

A specialist insurance company was looking to build a solution which would enable the validation of a mobile phone's condition, regardless of time and location. To answer this need, they built a smart image recognition tool that allows users to check their device's state at any given moment.

## BUSINESS NEED

As an insurance organisation, the company specialises in offering protection for mobile devices, working with network providers to provide insurance for new smartphones. As part of this service, the business also developed its own hardware to scan phones and detect any faults or cracks on the screen, acting as a pre-qualifier for insurance.

However, they also wanted to expand their offer to include older phones. To this end, they had an idea for an app that could be used on users' mobile devices. This app would determine a phone's condition similar to their hardware solutions, but users

would only need to take a photo using the device itself and a mirror, rather than specific equipment. This would enable users to check the quality of older phone screens at home, rather than physically visiting a store with the scanning devices.

In both cases, the organisation identified a need for powerful software that could quickly and accurately detect such faults. Because photographs were the only source of information available, this software would need advanced and sophisticated image recognition capabilities.

## PROJECT DETAILS

To meet the company's image recognition needs, a suitably advanced algorithm was needed to detect faults with a high accuracy rate. This was first developed for their hardware solution's controlled photography environment before adapting it to suit the mobile apps' wider requirements.

The algorithm was developed in numerous iterations, identifying more and more faults, as well as eliminating irrelevant 'false positive' obstructions. A key milestone was designing the algorithm in such a way that it would be able to easily distinguish between regular features, (which weren't faults), from irregular features, (which could turn out to be faults). This algorithm greatly optimised the fault detection process and ensured users receive verdicts that are more reliable.

Validation is achieved by cycling the original photograph through over 35 filtering steps, including numerous gradient checks, contours, and visual maps. Here, the app detects and extracts any possible faults, notifying the owner if any are found. If none are found, a suitable insurance policy is offered for the phone, which users are able to accept directly using the app.

Image processing itself occurs on remote backend servers before sending the user a final result. This entire approach, from the user's initial photograph to the app's verdict and potential insurance offer, only takes 3 minutes.

## BUSINESS BENEFITS

Alongside the existing scanner hardware, the new app enables the company to extend their services to entirely new markets. This mobile application enables users to validate and insure their existing devices, allowing more people to gain financial protection.

- Users can take a photo of their phone using a mirror and the app will verify the device's condition in 3 minutes
- Using the gathered information, the app will offer an insurance offer, if a device is approved
- Customers can decide to insure a new phone at a later date, even if they are not in-store to validate its condition
- The final application enables companies to offer insurance for older phones, as they can now validate their current condition and propose a plan
- It is designed to work with network providers and operators, adding the insurance to a user's existing monthly phone bill, without additional card payments or details
- Network operators now have a quick and effective means of validating customer phones, enabling better business

# 3 min

**Validation time** from photo to policy.

# 90%

**Accuracy rate** (actual result from test set - 89.623%).

# 35+

Image analysis **steps executed** in seconds.

## TECHNICAL DETAILS

### SOLUTIONS

Visual tracking and positioning systems, actor-model processing, image processing

### TECHNOLOGIES

.Net, Akka.Net micro services, Python, C++, OpenCV, Odroid, iOS, Android

### TOOLS

C# 7.3, VS 2017, EF 6.2 C++ 17, Git, BitBucket, Jira, .NET 4.7, .NET Core, OWIN, Kertrel

### TEAM

6 x Backend Developers, 2 x Testers, 1 x Business Analyst, 3 x Mobile Developers, 3 x Frontend Developers

## ABOUT THE CLIENT

The company provides specialist insurance for mobile devices. Their services are available on over 3 continents and they partner with a range of network providers and operators.

## ABOUT PGS SOFTWARE

PGS Software is one of the largest public listed custom software & services providers in Poland. As an AWS Advanced Consulting Partner, we specialise in Cloud projects – consulting, cloud-native development, application modernisation, & migration. Working according to agile methodologies (Scrum, DevOps, & Continuous Delivery), we create mobile & web applications as well as provide Business Analysis, Visual Design, UX, UI, & QA services to Clients worldwide. We have development & business entities in Poland, UK, Germany, & Spain.



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