



Adastra Bulgaria, [www.adastragrp.bg](http://www.adastragrp.bg)

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### **Company's overview and our business context**

Adastra Group ([www.adastragrp.com](http://www.adastragrp.com)) is a leading provider of Information Management solutions to global Fortune 1000 companies. One of Canada's 50 Best Managed companies, Leveraging over a decade of experience across industries and technologies, Adastra bridges the gap between pressing business needs and technology consulting to protect existing investments and extend and unlock their business value. Adastra has over 800 employees worldwide with headquarters in Canada and the Czech Republic and offices in Russia, Germany, Slovakia and Bulgaria.

Adastra Bulgaria ([www.adastragrp.bg](http://www.adastragrp.bg)) was founded in the year 2007 and currently has two offices in the cities of Sofia and Varna. With over 140 employees, our portfolio includes various projects in the areas of Data Warehousing, Business Intelligence, Data Integration, Data Quality, Quality Assurance, Master Data Management, Big Data and Data Science for leading companies around the globe.

### **Problem – Authenticity Management Algorithm for Digital Images**

An Android application is used for taking pictures. Those pictures need to be digitally signed in order to verify their authenticity later. The task is to create an algorithm which adds a digital watermark to an image and a corresponding algorithm which verifies if a given image is watermarked by the original algorithm.

The following conditions must be met:

- The algorithm must be able to detect if the image has been tampered with – e.g. re-saving, cropping, resizing, editing small parts of the image in a photo-editing software, copying and moving regions, etc.
- There should be no visibly discernible difference between the original image and the watermarked image.
- Watermark verification should not require the original image.
- The watermark embedded in an image generated by using a particular marking key must be detected only by providing the corresponding information to the verification



algorithm. All other side information provided to the verification algorithm should fail to detect the mark.

- The insertion of a mark by unauthorised parties should be difficult.
- The watermark should be capable of being embedded in the compressed domain.

An optional requirement is that the verification algorithm should be able to locate and characterize the changes made to a watermarked image.

The winning solution will consist of:

- A comprehensive description of a fast watermarking algorithm
- A comprehensive description of a verification algorithm
- Theoretical justification of the algorithm
- Estimation of RAM usage
- Android implementation of the watermarking algorithm and benchmarking using different image sizes