

VERIFAI.

id verification **done right**

Whitepaper January **2018**

Overview

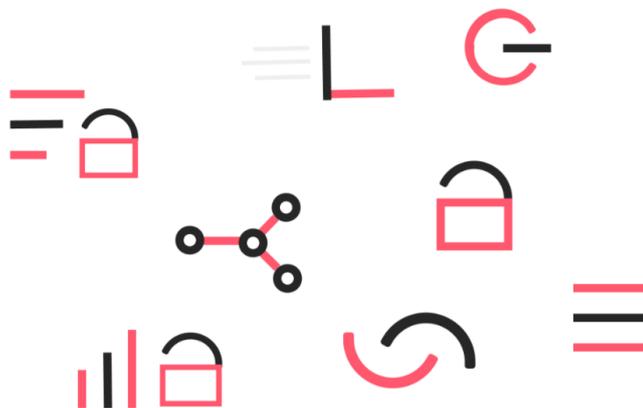
This whitepaper describes Verifai’s view of their state-of-the-art ID verification technology, why Verifai is created, how Verifai works, and why you have to choose for Verifai.

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PART 1: Benefits of the move to automatic identity verification

In today's modern world, the verification of different personal documents, such as Identification (ID) cards, passports, debit and credit cards have become common practice by many businesses and governmental institutions around the globe. Every day, millions of people have to provide their personal documents to get things done. Travelers have to show their ID to check-in for their flight at the airport, or when they are renting a car. Tourists have to show their ID when they check-in for a hotel room. Consumers have to show their ID when they open a new bank account; when they want to get an insurance coverage; or when they buy a new SIM card for their phone. Hence, verification with different personal documents has become routine in today's society. However, facing serious risks in the verification procedure is still very common in many businesses. The use of falsified personal documents or the theft of highly sensitive personal information are just a few examples of these risks. In the last couple of years, many countries implemented privacy acts and legal regulations, such as the GDP Regulation in the European Union,¹ to make sure that personal documents are processed safe and secure by organizations and governmental institutions.

Verifai provides the benefits of a simple move to verify personal information in perfection. The state-of-the-art Artificial Intelligence/machine learning technology of Verifai ensures organizations and governmental institutions a safe and secure protection of personal information; a fully authorized solution which is functioning according to all new privacy acts and legal regulations of the European Union; a driver of continuous improvement with the Artificial Intelligence (AI) and Deep Learning technology; a reliable verification procedure; a cost-effective solution; and a fast and simple user interface. A more detailed explanation about all impressive benefits of Verifai's software will be provided below.



¹ Source: The European Parliament and the Council of the European Union (2016). Regulation (EU) 2016/679 of the European Parliament and the Council of 27 April 2016 on the protection of natural persons with regard to the processing of personal data and on the free movement of such data, and repealing Directive 95/46/EC (General Data Protection Regulation). *Official Journal of the European Union*.

Protection of Sensitive Personal Information

Why is the protection of sensitive personal information important for an organization? The use and distribution of sensitive personal information has become readily available since the Internet is widely used in human society.² Every person who uses the internet is exposed on the chance to be victim of fraud and identity theft.³ Unfortunately, identity theft, where criminals use another's personal identifying information unlawful, is a rising common crime in both, the online and offline world.⁴ In the United States alone, 6,15% of all consumers were victim of identity theft and fraud in 2016⁵. Obviously, not only consumers are responsible for protecting their own personal information, also organizations who are processing and storing personal information of their clients are obliged to provide safe and secure services in personal information protection. In today's businesses and governmental institutions, the verification, processing, and storage of sensitive personal information in a safe and secure environment needs to be a top priority.

How can you ensure a safe and secure environment to verify sensitive personal information? With Verifai, you can verify important identification documents efficiently without the privacy and security risks of traditional manual verification methods. Verifai is unique in that it doesn't store personal data on foreign, centralized servers. Instead, personal data is only briefly stored on the device used to verify the document and is subsequently deleted. It also uses one-of-a-kind privacy filters and real-time blocking of sensitive personal information, such as the document photo, Social Security Number and the Machine-Readable Zone (MRZ), to ensure the protection of your customer's data. In practice, this means data breaches from centralized servers are impossible. This allows Verifai to be second to none when it comes to creating trusting and loyal customers.

Privacy Acts and Legal Regulations

Why protect personal information? The protection of personal information is in today's business a high priority issue. Organizations have to conform to the latest national and international privacy acts and regulations. In the European Union for example, organizations will get a fine of 4% of the company's annual worldwide turnover if the 2018s EU GDPR Regulation will be breached.⁶ The concerns are being strengthened by the increase of reported breaches and leaking scandals in the media of how personal information is processed and stored by organizations around the globe. A wake-up call for many organizations is necessary to meet the GDPR Regulations in Spring 2018, and to ensure the safe and secure verification, processing and storage of highly sensitive personal information. Seven key principles were set in total to meet the GDPR standards. An overview of the seven principles are provided below.

² Source: Congressional Research Service (2016, April 6). Privacy Protections for Personal Information Online. Retrieved from <https://fas.org/sqp/crs/misc/R41756.pdf>.

³ Source: Ball, A. L., Ramim, M. M., and Levy, Y. (2015). Examining users' personal information sharing awareness, habits, and practices in social networking sites and e-learning systems. *Online Journal of Applied Knowledge Management*, 3(1), 180-207.

⁴ Source: Bellah, J. (2001). Training: Identity theft. *Law & Order*, 49(10), 222-227.

⁵ Source: Pascual, A., Marchini, K., and Miller, S. (2017, February 1) 2017 Identity Fraud: Securing the Connected Life. Retrieved from <https://www.javelinstrategy.com/printpdf/35786>.

⁶ Source: Gould, C., Hermansson, N., and Elder, L. (2016). EY: EU General Data Protection Regulation: Are you ready? Retrieved from [http://www.ey.com/Publication/vwLUAssets/EY-eu-general-data-protection-regulation-are-you-ready/\\$FILE/EY-eu-general-data-protection-regulation-are-you-ready.pdf](http://www.ey.com/Publication/vwLUAssets/EY-eu-general-data-protection-regulation-are-you-ready/$FILE/EY-eu-general-data-protection-regulation-are-you-ready.pdf)

- Transparency: the customer knows that his/her data is being used and processed, gave permission to do so and knows his/her rights.
- Goal restriction: personal data is only being collected for authorized and lawful purposes and may not be used for any other purposes.
- Data restrictions: only necessary personal information is being collected.
- Correctness of data: personal information should be correct and should stay correct.
- Integrity and trust: Personal information should be protected against unauthorized access, lost, theft and destruction.
- Integrity and trust: Personal information should be protected against unauthorized access, lost, theft and destruction.
- Accountability: the responsible party should be able to show that it complies to all GDPR-regulations.

How do you meet the requirements of the latest privacy acts and personal data regulations of the European Union? With Verifai's leading verifying software, business can verify, process and store highly sensitive personal information, such as ID cards, passports and bank cards, according to the latest acts and regulations. Verifai provides you software which is fully operating according to the GDP 2018 Regulation of the European Union.

Continuous improvement with AI Technology

Why is Artificial Intelligence (AI) an important driver for continuous improvement? While the first concepts of AI are crafted half a decade ago, AI became popular on full-scale as a self-learning technology only a few years ago.⁷ AI enables software to learn about their users, applications and the environment where it is operating in.⁸ This approach fosters a continuous improvement process to make the software better and better over time. As many studies already show, AI Technology is a perfect enabler to automate visual object recognition by learning from every move.

How can you continuous improve your verification process? Gain access to a custom tool that is tailored to your unique software, app, or website by providing us with content that Verifai should exclude. With the help of machine learning, we'll update Verifai by feeding it new templates, so you'll immediately have a tool that is better attuned to your specific requirements. That way, thanks to your input, Verifai will always suit your needs, even if these change over time.

Reliability of the Verification Procedure

Why is the reliability of the personal information verification procedure important? Sensitive documents with personal information, such as ID cards, passports, and debit and credit cards are very important to retrieve the genuine identity of a person. Without a proper and fully reliable verification procedure, it will become very easy for criminals to commit identity theft and fraud. Criminals can open bank accounts, book a flight, rent a car or buy a SIM card on the name of the victim. Today, many passports and identification are provided with reliable biometrics verification to prevent scams, frauds and identity thefts.⁹ However, many organizations taking over personal information from ID cards, passports or other documents manually by hand into their own system. This process is not only very time consuming, but human mistakes can occur

⁷ Digital McKinsey (2017). Smartening up with Artificial Intelligence (AI) - What's in it for Germany and its Industrial Sector? Retrieved from https://www.mckinsey.de/files/170419_mckinsey_ki_final_m.pdf

⁸ Source: Kelly, J. E. (2015). Computing, cognition and the future of knowing - How humans and machines are forging a new age of understanding. Retrieved from https://www.research.ibm.com/software/IBMResearch/multimedia/Computing_Cognition_WhitePaper.pdf.

⁹ Source: Frontex (2010). BIOPASS II Automated biometric border crossing systems based on electronic passports and facial recognition: RAPID and SmartGate. Retrieved from http://frontex.europa.eu/assets/Publications/Research/Biopass_Study_II.pdf.

very quickly as well. This means that the conventional methods are not reliable in the processing of personal information from ID cards, passports and other documents.

How can you ensure a reliable verification process? Verifai allows you to scan and process identification documents in real-time with extreme accuracy. Our identification document verification technology is unrivaled when it comes to reading identification documents under less than optimal conditions, including in direct sunlight and in the dark.

Cost-Efficient Technology

Why you should invest in cost-effective verification software? In the last couple of years, the number of ID verifications is increasing very rapidly. For example, in 2016, the global number of air traffic passengers increased with 7.4%,¹⁰ the global average hotel rates increased with 2.5%,¹¹ and the global average car rental rates increased with 0,1%.¹² All these services require the verification of personal identification documents. Businesses and governmental institutions are forced to look beyond their current verification procedures to keep ensure a cost-effective verification procedure of personal identification documents in the future.

How can you reduce costs in your ID verification processes? Verifai makes traditional identification document verification processes obsolete by offering a comprehensive, transparent alternative. This saves time and decreases paperwork, work hours, and manual labor, so you can cut down costs associated with ineffective verification methods.

Fast and Simple

Why you should have a fast and simple user interface? A powerful usability interface ensures many users an effective, efficient and satisfying user experience.¹³ To ensure an optimal integration of software applications in current IT systems, Application Programming Interfaces (API)¹⁴ and Software Development Kits (SDK) are mostly provided by software developers. How can you increase the efficiency of your ID verification processes? From startups to global enterprises, Verifai can be integrated into software, apps, or websites by anyone. Whether you're a small business concerned with streamlining your verification process or a leading enterprise wanting to provide the utmost in terms of security for your customers - Verifai has got you covered. Thereby, Verifai offers a safer, easier and more transparent alternative for customers in any industry by providing up-to-date API's and KPI's for IOS and Android applications. With our ID verification technology, we aim to raise the bar for consumer privacy, where pairing excellent security with an impeccable consumer experience will become the new standard. Your customer will know their data is safe without any inconvenience on their end.

¹⁰ Source: Statista (2017, November 1). Annual growth in global air traffic passenger demand from 2005 to 2017. Retrieved from <https://www.statista.com/statistics/193533/growth-of-global-air-traffic-passenger-demand/>.

¹¹ Source: Statista (2017, November 1). Annual growth in average global hotel rates from 2010 to 2017. Retrieved from <https://www.statista.com/statistics/324793/annual-growth-in-average-global-hotel-rates/>.

¹² Source: Statista (2017, November 1). Annual growth of average global car rental rates from 2010 to 2017. Retrieved from <https://www.statista.com/statistics/324802/annual-growth-of-average-global-car-rental-rates/>.

¹³ Source: Petrie, H., Bevan, N. (2009). The evaluation of accessibility, usability and user experience. *The Universal Access Handbook*. Retrieved from http://www.nigelbevan.com/papers/The_evaluation_of_accessibility_usability_and_user_experience.pdf.

¹⁴ Source: Smartbear (2016). The State of API 2016: A Global Survey looking at the Growth, Opportunities, Challenges, & Processes for the API Industry in 2016. Retrieved from <https://smartbear.com/SmartBear/media/ebooks/State-of-API-Report-2016.pdf>.

PART 2: Why Verifai is created?

Verifai is founded as a spin-off company of Belsimpel.nl. With more than one million annually clients, Belsimpel.nl is the biggest independent telecom retailer of the Netherlands. Every day, Belsimpel.nl verifies thousands of identification documents to ensure a fully protected SIM card registration. Today, Verifai's leading software is developed to ensure a total safe and secure verification procedure of identification documents in all industries around the globe.

Throughout the years, the ID verification landscape has been changed intensely. The technological road of ID verification started many years ago by verifying each ID document manually. Today, many state-of-the-art technologies such as RAPID and AI verification software are disrupt the old-fashion method to ensure a secure, reliable and fast way to verify ID documents.¹⁵ The conventional manual ID verification methods do not meet the high standards of today's society. State-of-the-art technologies such as Verifai are used in place of the conventional methods to verify ID documents in perfection.

Still, identity theft and fraud with stolen and lost ID cards is still a major problem around the globe. In the UK alone, stolen and lost ID cards costs the UK population £114,400,000 annually.¹⁶ Not only consumers are victim of these criminal practices, also businesses who are verifying fake identification documents and dealing with data breaches have a problem.¹⁷ Mostly, these businesses have to pay a huge price for fines when they do not have a secured and reliable method to verify identification problems. Certainly, when the new EU GDP Regulations will be effective in 2018.

PART 3: How does Verifai work?

With Verifai's fast and simple ease of use interface, you are able to speed-up your verification procedure in a fully secure and reliable user environment. Verifai's proven technology enables you to verify identification documents very rapidly. With only a simple move, you can ensure the verification of identification documents in perfection. When you have integrated Verifai's SDK into your own IOS, Android or web-based application, Verifai is ready to use!

Step 1: Take a picture with Verifai of all sides of the identification document.

Step 2: Verifai is processing and verifying only the required personal information straight on your device.

Step 3: All required personal information is verified, translated and processed in your system.

¹⁵ Source: Frontex (2010). BIOPASS II Automated biometric border crossing systems based on electronic passports and facial recognition: RAPID and SmartGate. Retrieved from http://frontex.europa.eu/assets/Publications/Research/Biopass_Study_II.pdf.

¹⁶ Source: European Commission (2007) Report on Identity Theft/Fraud – Fraud prevention Expert Group. Retrieved from http://ec.europa.eu/internal_market/fpeg/docs/id-theft-report_en.pdf.

¹⁷ Source: Kende, M. (2016). Global Internet Report 2016. Retrieved from https://www.internetsociety.org/globalinternetreport/2016/wp-content/uploads/2016/11/ISOC_GIR_2016-v1.pdf.

Highest Performance

Verifai's SDK is designed for Android and iOS and works on both tablets and smartphones. Our solution delivers extraordinarily high performance in terms of speed and accuracy with help of GPU technology. Most modern hardware offers multiple cores, a dedicated GPU and more than enough speed to be able to run our software. In concrete terms, this means that Verifai runs on 64bit hardware, with a GPU that supports OpenGL. However, a custom-made 32 bits solution is made available too.

To stay ahead of the curve, we make use of multiple parallel processes that allow us to analyze, learn from, and provide feedback to the user. While other solutions are often older and rely on traditional models, Verifai uses everything that modern hardware architecture has to offer. We utilize all the power available, so you never have to settle!

Machine Learning

As we employ all the accelerating hardware in your device, we are able to load complex deep learning neural networks that are capable of detecting identification documents with incredible accuracy and speed. Despite the field of Computer Vision being relatively new, in our case, results literally get better every day, as we run complex simulations on dedicated GPU servers to fine-tune the classifiers.¹⁸

We aim to process new sample data within 24 hours. If you send us custom images, you will receive a notification when the test set is ready, so you can test whether the results have improved. We understand that situations need to evolve over time, which is why we've developed a tool that can efficiently adapt to these changes as soon as they arise.

32 bits vs. 64 bits support

Since one of the enablers of neural network technology was the introduction of 64-bit processors, it is only available on newer chipsets. Neural networks have a potential to be much larger than the memory addressing space allows on 32-bits or lower. You can run it on 32-bits or even 16-bits, but this would lead to memory issues. Therefore, 32-bit infrastructures are not sufficient support deep neural learning.

Basically, the solution is to use the user's brain to do what AI does normally. Therefore, if you are using 32-bit hardware we offer a solution where the user can select by him- or herself which country and which document type (e.g. ID, passport or driving license) is being scanned. Next, the user can choose the model of the document out of a list of sample-documents. Now the user can scan the document by holding it in the square on the screen. Verifying ID's will be just as easy and reliable as in our normal version!

¹⁸ Schlegel, D. (2015). Deep Machine Learning on GPUs. Retrieved from http://www.ziti.uni-heidelberg.de/ziti/uploads/ce_group/seminar/2014-Daniel_Schlegel.pdf.

Security

Providing airtight security is one of our top priorities. We believe that working with identification documents is a major responsibility that is not to be taken lightly. That is why our software has been engineered to guard the privacy of your customers from the very beginning to the very end.

We operate on the simple principle that if sensitive information is never stored on the device, it can never leave the device. That is why Verifai does not store any data on the local device and overwrites the memory with random information when processing has been completed.

If you would like to learn more please download our special document on fraud prevention.

Privacy Filter

Many companies store information about their clients, and, in most countries, it is required by law to know your customer.¹⁹ However, knowing your customer and keeping a copy of their data as provided on their ID card are two separate things. We believe it is important to make this distinction. That is why we provide a set of real-time blocking templates that can be used to cover privacy-sensitive information, including social security numbers and photos. We do not only provide the template, but we also wipe the data and immediately from the image that you receive. The SDK returns one or two bitmaps, so there is no trace of the original or processed data.

Statistics with encryption

We require statistics to improve our software. As we do not want to use private information concerning your customers, we collect statistics locally. We send this data over regularly, at least once a day. The data is grouped, so we know what type of documents are scanned and what the hit ratios are. We also collect device information, including the number of cores, the version of the operating system and the SDK used. This data is sent to us on a secure connection. For security reasons, we only support TLS 1.2.²⁰ The statistical encrypted data allows us to monitor Verifai's performance and to ensure a perfect up-to-date user experience for our clients.

Updates to Templates and Neural Net

The neural net and the classifiers are not part of the SDK itself. The first time you start the SDK, these will be downloaded from our servers. This keeps the SDK small, although the neural net itself is not very large either. It also prevents you from having to upgrade the entire app when you need to swap a classifier. We sign each new version of the classifiers and neural net, so you can be sure that these are authentic.

Offline

The SDK is fully autonomous. After the first initialization, it can operate on its own. This means that Verifai works fully offline iOS or Android applications. An internet connection is not required, but recommendable to keep Verifai up-to-date. That way, you can focus on your business, whilst leaving ID verification and data security up to Verifai.

¹⁹ Source: The European Parliament and the Council of the European Union (2016). Regulation (EU) 2016/679 of the European Parliament and the Council of 27 April 2016 on the protection of natural persons with regard to the processing of personal data and on the free movement of such data, and repealing Directive 95/46/EC (General Data Protection Regulation). *Official Journal of the European Union*.

²⁰ Bhargavan, K., Fournet, C., Kohlweiss, M., Pironti, A., and Strub, P. (2013) Implementing TLS with Verified Cryptographic Security. Retrieved from <https://www.mitls.org/downloads/miTLS-report.pdf>.

PART 4: Why choose Verifai?

Verifai is the best solution on the market to verify personal identification documents in all global industries. Verifai's powerful state-of-the-art technology provide you a total secure and reliable product, based on the latest GDP Regulations of the European Union. With a fast and extreme adaptable user-friendly interface (customizable SDK and API), you will be able to continuously improve the verification process of identification documents to keep operating on the highest performance and to gain massive cost-effective improvements.