



VeriFinger 6.2/MegaMatcher 3.1 Algorithm Demo

User's guide

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1 Introduction

VeriFinger 6.2/MegaMatcher 3.1 Algorithm Demo application is designed with aim to demonstrate the advanced capabilities of Neurotechnology fingerprint recognition engine. The program is a Windows 2000/XP/Vista/7, Linux OS 2.6 (or newer) or Mac OS X application controlled via a pull-down menu system.

The application has four operation modes:

1. Fingerprint **enrollment**. Software processes the fingerprint image, extracts features and writes them to the database.
2. **Enrollment with features generalization**. This mode generates the generalized fingerprint features collection up-to ten fingerprints of the same finger. Each fingerprint image is processed and features are extracted. Then multiple collections of features are analyzed and combined into one generalized features collection, which is written to the database. The fingerprint recognition quality considerably increases if fingerprints were enrolled using this mode. Features generalization can use from 3 to 10 collections.
3. Fingerprint **verification** mode. This mode performs 1:1 fingerprints matching.
4. Fingerprint **identification** mode. This mode performs 1:N fingerprint matching. Using this mode fast or full fingerprints matching can be performed.

Operation mode can be changed using "Mode" menu.

Neurotechnology fingerprint recognition algorithm demo shows how to considerably decrease the recognition time by stopping the fingerprint matching process when positive matching result is found (successful identification). To turn off this feature go to "Options" dialog (Tools»Options...) and select "Stop on first result".

In the application the database entries are pre-sorted using certain global features. Thereafter, matching is performed first within small part of the database entries having most similar global features to those of the test fingerprint. If matching within this group yields no positive result, then the next group with most similar global features is examined and so on, until the matching is successful or the end of the database is reached (this behavior can be changed by modifying value of "Match at most XXX% of database" in "Options" dialog). In most cases there is fairly good chance that correct match will be found already in the first group. Consequently, the number of comparisons required to achieve positive matching becomes drastically decreased, and correspondingly, the effective matching speed increases. This feature can be used with fast identification mode (in this case G is used).

1.1 Fingerprint Scanners

The following fingerprint scanners are supported:

Fingerprint scanner model	Description	Requirements
ARH AFS 510	AFS510 live scanner is a professional, compact 10 fingerprint scanning device for acquisition of single finger flats, rolls and four finger slaps. Supported OS: Microsoft Windows (32 bit)	DLLs: <ul style="list-style-type: none">• FPSmm\FPSmmArhFpr.dll

U.are.U 2000S	<p>The U.are.U 2000 fingerprint scanner is a self-contained sensor for capturing a fingerprint and communicating the digital image to Pfc via USB interface. The on-board electronics control image capture, self-calibration, and the Plug-n-Play USB interface.</p> <p>Supported OS: Microsoft Windows (32 bit and 64 bit).</p>	<p>Drivers:</p> <ul style="list-style-type: none"> • \install\Fingerprint Scanners\UareU\ <p>DLLs:</p> <ul style="list-style-type: none"> • FPSmm\FPSmmUareU.dll
DigitalPersona U.are.U 4000S / U.are.U 4000B	<p>The U.are.U 4000 fingerprint sensor is designed to work with PC via USB port. It has slim design and small form factor. The on-board electronics control image capture, latent fingerprint rejection, self-calibration, and the Plug-n-Play USB interface.</p> <p>Supported OS: Microsoft Windows (32 bit and 64 bit).</p>	<p>Drivers:</p> <ul style="list-style-type: none"> • \install\Fingerprint Scanners\UareU\ <p>DLLs:</p> <ul style="list-style-type: none"> • FPSmm\FPSmmUareU.dll
DigitalPersona U.are.U Fingerprint Keyboard	<p>This is 104-key Windows compatible keyboard with a built-in U.are.U 4000 fingerprint sensor. The keyboard requires two connections: PS/2 connection for keyboard functioning and USB for fingerprint scanner.</p> <p>Supported OS: Microsoft Windows (32 bit and 64 bit).</p>	
DigitalPersona U.are.U 4000 Fingerprint Module	<p>Description: The U.are.U 4000 Module is a small fingerprint scanner designed for integration into OEM equipment where fingerprint authentication is needed.</p> <p>Supported OS: Microsoft Windows (32 bit and 64 bit).</p>	
DigitalPersona U.are.U 4500	<p>DigitalPersona U.are.U 4500 is an optical USB 2.0 fingerprint scanner. The scanner is able to reject latent and spoof fingerprints.</p> <p>Supported OS: Microsoft Windows (32 bit and 64 bit).</p>	<p>Drivers:</p> <ul style="list-style-type: none"> • \install\Fingerprint Scanners\UareU\ <p>DLLs:</p> <ul style="list-style-type: none"> • FPSmm\FPSmmUareU.dll
Cross Match Verifier 300 Classic	<p>This scanner is intended for professional use. It operates via USB port.</p> <p>Supported OS: Microsoft Windows (32bit)</p>	<p>Drivers: Can be downloaded from CrossMatch website (section "USB SDK for Verifier and MV5 Scanners/Readers") http://www.crossmatch.com/software.html#_USB_SDK_for</p> <p>DLLs:</p> <ul style="list-style-type: none"> • FPSmm\FPSmmCrossMatch.dll
Cross Match Verifier 300 LC	<p>Verifier 300 LC (Lexan Case) features light weight (less than 0.5 kg). It operates via USB port.</p> <p>Supported OS: Microsoft Windows (32bit).</p>	<p>Drivers: Can be downloaded from CrossMatch website (section "USB SDK for Verifier and MV5 Scanners/Readers") http://www.crossmatch.com/software.html#_USB_SDK_for</p> <p>DLLs:</p> <ul style="list-style-type: none"> • FPSmm\FPSmmCrossMatch.dll
Cross Match Verifier 300 LC 2.0	<p>An improved version of Verifier 300 LC. Features faster frame rate and an I/R filter to improve ambient light rejection.</p> <p>Supported OS: Microsoft Windows (32bit).</p>	<p>Drivers: Can be downloaded from CrossMatch website (section "USB SDK for Verifier and MV5 Scanners/Readers") http://www.crossmatch.com/software.html#_USB_SDK_for</p> <p>DLLs:</p> <ul style="list-style-type: none"> • FPSmm\FPSmmCrossMatch.dll

Cross Match Verifier 310	<p>This scanner allows to scan two flat fingerprints simultaneously or one rolled fingerprint.</p> <p>Supported OS: Microsoft Windows (32bit).</p>	<p>Drivers: Can be downloaded from CrossMatch website (section "USB SDK for Verifier and MV5 Scanners/Readers") http://www.crossmatch.com/software.html#_USB_SDK_for</p> <p>DLLs:</p> <ul style="list-style-type: none"> FPSmm\FPSmmCrossMatch.dll
Futronic FS80, Futronic FS82	<p>Supported OS: Microsoft Windows (32bit and 64bit), Linux (32 bit).</p> <p>Remarks: Configuration futronic.cfg file with parameter LFD = false will turn of the life fingerprint detection. For BioLink U-Match MatchBook v.3.5 scanner file with parameter LFD = false should be created all the time.</p>	<p>Drivers:</p> <ul style="list-style-type: none"> \install\Fingerprint Scanners\Futronic\ <p>DLLs:</p> <ul style="list-style-type: none"> FPSmm\FPSmmFutronic.dll FPSmm\ftrScanAPI.dll
Futronic eFAM (FS84)	<p>Futronic FS84 is an ethernet Fingerprint Authentication Module (eFAM) suitable for embedded, regular or remote applications. The module can be controlled via standard Ethernet interface by any host system or via serial interface.</p> <p>1 output channel (for external relay control) and 2 input channels (for door sensor and switch) are available for external device control. Electric lock or other electric device can be activated by eFAM using these output control signals.</p> <p>Supported OS: Microsoft Windows (32bit and 64bit), Linux (32 bit and 64 bit), Mac OS X.</p> <p>Remarks: FPSmmFutronicEthernetFam.ini file is intended for scanner configuration. Scanner IP address and port should be placed in file. Examples: 192.168.2.255 5001 or for few scanners 192.168.2.253 5001 192.168.2.254 5001 192.168.2.255 5005</p>	<p>Drivers:</p> <ul style="list-style-type: none"> \install\Fingerprint Scanners\FutronicEthernetFam\ <p>DLLs:</p> <ul style="list-style-type: none"> FPSmm\FPSmmFutronicEthernetFam.dll
Futronic FS88	<p>The scanner is an enhanced version of Futronic FS80 scanner. This scanner was certified by FBI to be compliant with PIV-071006 Image Quality Specification for Singer Finger Reader. The FS88 scanner includes an electronic circuit for live finger detection.</p> <p>Supported OS: Microsoft Windows (32bit and 64bit), Linux (32 bit).</p> <p>Remarks: Configuration futronic.cfg file with parameter LFD = false will turn of the life fingerprint detection. For BioLink U-Match MatchBook v.3.5 scanner file with parameter LFD = false should be created all the time.</p>	<p>Drivers:</p> <ul style="list-style-type: none"> \install\Fingerprint Scanners\Futronic\ <p>DLLs:</p> <ul style="list-style-type: none"> FPSmm\FPSmmFutronic.dll FPSmm\ftrScanAPI.dll

Futronic FS50	<p>This scanner can capture single finger, dual finger and roll finger image. The scanner can also handle bad fingers such as dry, wet, blurred and scarred without any problem.</p> <p>Supported OS: Microsoft Windows (32bit and 64bit)</p> <p>Remarks: Configuration <code>futronic.cfg</code> file with parameter LFD = false will turn of the life fingerprint detection.</p>	<p>Drivers:</p> <ul style="list-style-type: none"> • \install\Fingerprint Scanners\Futronic\ <p>DLLs:</p> <ul style="list-style-type: none"> • FPSmm\FPSmmFutronic.dll • FPSmm\ftrScanAPI.dll
Futronic FS60	<p>FS60 is professional fingerprint scanner which can capture high quality 4 fingerprints image.</p> <p>Supported OS: Microsoft Windows (32 bits)</p>	<p>Drivers:</p> <ul style="list-style-type: none"> • \install\Fingerprint Scanners\FutronicMF\ <p>DLLs:</p> <ul style="list-style-type: none"> • FPSmm\FPSmmFutronicMF.dll • FPSmm\ftrMFAPI.dll
NITGEN enBioScan-F	<p>The scanner meets FBI's Integrated AFIS Image Quality Specifications (IQS) and is able to scan wet fingers.</p> <p>Supported OS: Microsoft Windows (32bit and 64bit), Linux (32 bit).</p> <p>Remarks: FPSmmNitgen.dll from <i>Additional</i> folder should be copied to FPSmm folder in order to use this scanner driver.</p>	<p>Drivers:</p> <ul style="list-style-type: none"> • \install\Fingerprint Scanners\Nitgen\ <p>DLLs:</p> <ul style="list-style-type: none"> • FPSmm\Additional\FPSmmNitgen.dll • FPSmm\NBioBSP.dll
NITGEN Fingkey Hamster	<p>Supported OS: Microsoft Windows (32bit and 64bit).</p> <p>Remarks: FPSmmNitgen.dll from <i>Additional</i> folder should be copied to FPSmm folder in order to use this scanner driver.</p>	<p>Drivers:</p> <ul style="list-style-type: none"> • \install\Fingerprint Scanners\Nitgen\ <p>DLLs:</p> <ul style="list-style-type: none"> • FPSmm\Additional\FPSmmNitgen.dll • FPSmm\NBioBSP.dll
NITGEN Fingkey Hamster II	<p>Supported OS: Microsoft Windows (32bit and 64bit).</p> <p>Remarks: FPSmmNitgen.dll from <i>Additional</i> folder should be copied to FPSmm folder in order to use this scanner driver.</p>	<p>Drivers:</p> <ul style="list-style-type: none"> • \install\Fingerprint Scanners\Nitgen\ <p>DLLs:</p> <ul style="list-style-type: none"> • FPSmm\Additional\FPSmmNitgen.dll • FPSmm\NBioBSP.dll
SecuGen Hamster III scanner	<p>Supported OS: Microsoft Windows (32bit), Linux (32 bit).</p> <p>Remarks: FPSmmSecugenHFUDU03.dll from <i>Additional</i> folder should be copied to FPSmm folder in order to use this scanner driver.</p>	<p>Drivers:</p> <ul style="list-style-type: none"> • \install\Fingerprint Scanners\SecuGenHFUDU03\ <p>DLLs:</p> <ul style="list-style-type: none"> • FPSmm\Additional\FPSmmSecugenHFUDU03.dll
SecuGen Hamster Plus scanner	<p>Supported OS: Microsoft Windows (32bit).</p> <p>Remarks: FPSmmSecugenHFUDU02.dll from <i>Additional</i> folder should be copied to FPSmm folder in order to use this scanner driver.</p>	<p>Drivers:</p> <ul style="list-style-type: none"> • \install\Fingerprint Scanners\SecuGenHFUDU02\ <p>DLLs:</p> <ul style="list-style-type: none"> • fpsmm\Additional\FPSmmSecugenHFUDU02.dll

SecuGen Hamster scanner	IV Supported OS: Microsoft Windows (32bit). Remarks: FPSmmSecugenHFDU04.dll from <i>Additional</i> folder should be copied to <i>FPSmm</i> folder in order to use this scanner driver.	Drivers: <ul style="list-style-type: none">• \install\Fingerprint Scanners\SecuGenHFDU04\ DLLs: <ul style="list-style-type: none">• fpsmm\Additional\FPSmmSecugenHFDU04.dll
SecuGen iD-USB SC	Supported OS: Microsoft Windows (32bit). Remarks: FPSmmSecugenHFDU02.dll from <i>Additional</i> folder should be copied to <i>FPSmm</i> folder in order to use this scanner driver.	Drivers: <ul style="list-style-type: none">• \install\Fingerprint Scanners\SecuGenHFDU02\ DLLs: <ul style="list-style-type: none">• fpsmm\Additional\FPSmmSecugenHFDU02.dll
SecuGen iD-USB SC/PV	Supported OS: Microsoft Windows (32bit). Remarks: FPSmmSecugenHFDU04.dll from <i>Additional</i> folder should be copied to <i>FPSmm</i> folder in order to use this scanner driver.	Drivers: <ul style="list-style-type: none">• \install\Fingerprint Scanners\SecuGenHFDU04\ DLLs: <ul style="list-style-type: none">• fpsmm\Additional\FPSmmSecugenHFDU04.dll
Dermalog ZF1	The scanner is able to detect fake fingers and to scan both dry and wet fingerprints. Supported OS: Microsoft Windows (32bit).	Drivers: <ul style="list-style-type: none">• \install\Fingerprint Scanners\DermalogZF1\ DLLs: <ul style="list-style-type: none">• FPSmm\Additional\FPSmmDermalogZF1.dll• FPSmm\DermalogVC3.dll• FPSmm\DermalogCalibrateSDK.dll• FPSmm\DermalogLoggingFacility.dll• FPSmm\DermalogPLS1.dll• FPSmm\ZFScanAPI.dll
BioLink U-Match MatchBook v.3.5	Supported OS: Microsoft Windows (32bit), Linux (32 bit).	Drivers: <ul style="list-style-type: none">• \install\Fingerprint Scanners\Futronic\ DLLs: <ul style="list-style-type: none">• FPSmm\FPSmmFutronic.dll• FPSmm\ftrScanAPI.dll
Testech Bio-i	Supported OS: Microsoft Windows (32bit).	Drivers: <ul style="list-style-type: none">• \install\Fingerprint Scanners\Testech\ DLLs: <ul style="list-style-type: none">• FPSmm\FPSmmCyte.dll• FPSmm\BioNetCapture.dll

Startek FM200 scanner		<p>Supported OS: Microsoft Windows (32bit), Linux (32bit and 64bit), Mac OS X.</p> <p>Drivers:</p> <ul style="list-style-type: none"> • \install\Fingerprint Scanners\Startek\ <p>DLLs:</p> <ul style="list-style-type: none"> • FPSmm\FPSmmFM200.dll • FPSmm\fm200api.dll • FPSmm\FingerPrinterDll.dll • FPSmm\fm200drv.dll
Tacoma CMOS Scanner		<p>Supported OS: Microsoft Windows (32bit), Linux (32bit and 64bit), Mac OS X.</p> <p>Drivers:</p> <ul style="list-style-type: none"> • \install\Fingerprint Scanners\Tacoma\ <p>DLLs:</p> <ul style="list-style-type: none"> • FPSmm\FPSmmTacoma.dll • FPSmm\SmzCmos1.dll • FPSmm\SMZ_API.dll
Fujitsu MBF200		<p>Supported OS: Microsoft Windows (32bit), Linux (32bit and 64bit), Mac OS X.</p> <p>Drivers:</p> <ul style="list-style-type: none"> • \install\Fingerprint Scanners\Fujitsu\ <p>DLLs:</p> <ul style="list-style-type: none"> • FPSmm\FPSmmFujitsu.dll • FPSmm\libusb0.dll
Identix 2080	DFR	<p>Supported OS: Microsoft Windows (32bit).</p> <p>Remarks: Drivers for this scanner are not included into the VeriFinger 6.2/MegaMatcher 3.1 Algorithm Demo.</p> <p>Remarks: FPSmmIdentixR.dll from <i>Additional</i> folder should be copied to <i>FPSmm</i> folder in order to use this scanner driver.</p> <p>DLLs:</p> <ul style="list-style-type: none"> • FPSmm\Additional\FPSmmIdentixR.dll • FPSmm\Itf32_2080U2.dll
Identix 2090	DFR	<p>This scanner is intended for professional use. The image output is in USB digital and RS-170 analog video formats.</p> <p>Supported OS: Microsoft Windows (32bit).</p> <p>Remarks: Drivers for this scanner are not included into the VeriFinger 6.2/MegaMatcher 3.1 Algorithm Demo.</p> <p>DLLs:</p> <ul style="list-style-type: none"> • FPSmm\Additional\FPSmmIdentixR.dll • FPSmm\Itf32_2080U2.dll
Identix 2100	DFR	<p>Supported OS: Microsoft Windows (32bit).</p> <p>DLLs:</p> <ul style="list-style-type: none"> • FPSmm\Additional\FPSmmIdentixR.dll • FPSmm\Itf32_2080U2.dll
TST Biometrics BiRD 3		<p>TST Biometrics offers its <i>touchless sensor technology</i> that allows to scan a finger without physical contact with a fingerprint sensor. The BiRD 3 sensor is available as desktop scanner, on-wall mounted scanner and as OEM components. Optionally, a 5V AC powered heating device could be included for operating in cold environment.</p> <p>Supported OS: Microsoft Windows (32bit).</p> <p>Drivers can be downloaded from TST Biometrics website http://www.tst-biometrics.com/.</p> <p>DLLs:</p> <ul style="list-style-type: none"> • FPSmm\Additional\FPSmmTSTBIRD.dll • FPSmm\TSTBasic.dll

Digent Izzix FD1000	Supported OS: Microsoft Windows (32bit).	Drivers: <ul style="list-style-type: none"> • \install\Fingerprint Scanners\Digent\ DLLs: <ul style="list-style-type: none"> • FPSmm\FPSmmDigent.dll • FPSmm\IZZIX.dll
UPEK TouchChip TCRU1C	This scanner is built on the TouchChip Silicon Fingerprint Sensor. It communicates PC via USB port. Supported OS: Microsoft Windows (32bit).	Drivers: <ul style="list-style-type: none"> • \install\Fingerprint Scanners\Upek\ DLLs: <ul style="list-style-type: none"> • FPSmm\FPSmmUpek.dll • FPSmm\TCI.dll
UPEK TouchChip TCRU2C	Supported OS: Microsoft Windows (32bit).	Drivers: <ul style="list-style-type: none"> • \install\Fingerprint Scanners\Upek\ DLLs: <ul style="list-style-type: none"> • FPSmm\FPSmmUpek.dll • FPSmm\TCI.dll
UPEK Eikon	Supported OS: Microsoft Windows (32 bit)	Drivers: <ul style="list-style-type: none"> • \install\Fingerprint Scanners\Upek\ DLLs: <ul style="list-style-type: none"> • FPSmm\FPSmmEikon.dll
Eikon Touch 700, Eikon Touch 300	Supported OS: Microsoft Windows (32 bit)	Drivers: <ul style="list-style-type: none"> • \install\Fingerprint Scanners\Upek\ DLLs: <ul style="list-style-type: none"> • FPSmm\iaapi.dll • FPSmm\FPSmmUpek.dll
Green Bit DactyScan 26	Supported OS: Microsoft Windows (32bit). Remarks: Drivers for this scanner are not included into the VeriFinger 6.2/MegaMatcher 3.1 Algorithm Demo.	DLLs: <ul style="list-style-type: none"> • FPSmm\FPSmmDactyScan.dll • FPSmm\FSM26U.dll
Hongda S680	This scanner allows to scan rolled fingerprints. A plastic lid can be mounted on top of sensor for more comfortable flat fingerprint scanning. Supported OS: Microsoft Windows (32bit).	Drivers: <ul style="list-style-type: none"> • \install\Fingerprint Scanners\Hongda\ DLLs: <ul style="list-style-type: none"> • FPSmm\FPSmmHongda.dll
Jstac Athena 210	Supported OS: Microsoft Windows (32bit).	Drivers: <ul style="list-style-type: none"> • \install\Fingerprint Scanners\Jsatck\ DLLs: <ul style="list-style-type: none"> • FPSmm\FPSmmJstac.dll • FPSmm\WIS_API.dll • FPSmm\WisCmos2.dll

BiometriKa FX 2000	BiometriKa FX 2000 desktop fingerprint scanner is intended for using with PC. Scanner communicates PC via USB interface. FX 2000 contains 32 bit RISC processor for encrypting fingerprint data, controlling scanner operations and other operations. Supported OS: Microsoft Windows (32bit), Linux (32 bit).	Drivers: <ul style="list-style-type: none">• \install\Fingerprint Scanners\BiometriKa\ DLLs: <ul style="list-style-type: none">• FPSmm\FPSmmBiometrika.dll• FPSmm\fx3.dll• FPSmm\fx3scan.dll
BiometriKa FX 3000	Supported OS: Microsoft Windows (32bit), Linux (32 bit).	Drivers: <ul style="list-style-type: none">• \install\Fingerprint Scanners\BiometriKa\ DLLs: <ul style="list-style-type: none">• FPSmm\FPSmmBiometrika.dll• FPSmm\fx3.dll• FPSmm\fx3scan.dll
BiometriKa HiScan	Supported OS: Microsoft Windows (32bit), Linux (32 bit).	Drivers: <ul style="list-style-type: none">• \install\Fingerprint Scanners\BiometriKa\ DLLs: <ul style="list-style-type: none">• FPSmm\FPSmmBiometrika.dll• FPSmm\fx3.dll• FPSmm\fx3scan.dll
Lumidigm Venus Series sensors	Supported OS: Microsoft Windows (32bit and 64 bit), Linux (32 bit) Remarks: Configuration lumidigm.cfg file with parameter LFD = true will turn on the life fingerprint detection, parameter LFDThreshold=7000 is life fingerprint detection threshold, the LFDThreshold parameter range is [0-4294967296). lumidigm.cfg file should be placed near FPSmmLumidigm.dll file. Default parameters are LFD = false and LFDThreshold=7000	Drivers: <ul style="list-style-type: none">• \install\Fingerprint Scanners\Lumidigm\ DLLs: <ul style="list-style-type: none">• FPSmm\LumiAPI.dll• FPSmm\LumiCore.dll• FPSmm\FPSmmLumidigm.dll
Lumidigm Mercury Series sensors	Supported OS: Microsoft Windows (32 bit and 64 bit), Linux (32 bit)	Drivers: <ul style="list-style-type: none">• \install\Fingerprint Scanners\Lumidigm\ DLLs: <ul style="list-style-type: none">• FPSmm\LumiAPI.dll• FPSmm\LumiCore.dll• FPSmm\FPSmmLumidigm.dll

Dakty Fingerprint NAOS-A	<p>A fiber optic fingerprint sensor with live finger detection using human body capacitance, blood oxygen presence and pulse measuring.</p> <p>Supported OS: Microsoft Windows (32bit).</p>	<p>Drivers:</p> <ul style="list-style-type: none"> • \install\Fingerprint Scanners\DaktyFpd\ <p>DLLs:</p> <ul style="list-style-type: none"> • FPSmm\FPSmmDaktyScan.dll • FPSmm\DaktyImage.dll • FPSmm\fpd.dll • FPSmm\fpdusb.dll • FPSmm\Segmentation.dll
id3 Certis Image	<p>An Atmel FingerChip based scanner with a sweeping thermal sensor.</p> <p>Supported OS: Microsoft Windows (32bit).</p>	<p>Drivers:</p> <ul style="list-style-type: none"> • \install\Fingerprint Scanners\Certis\ <p>DLLs:</p> <ul style="list-style-type: none"> • FPSmm\FPSmmCertis.dll • FPSmm\CertisExports.dll • FPSmm\Id3BiokeyDll.dll
CS-Pass USB Fingerprint Sensor	<p>The CS-Pass USB Fingerprint Sensor is based on AuthenTec AES4000 sensor. It is suitable for PC and mobile devices, including battery powered devices. The sensor can be customized for specific projects.</p> <p>Supported OS: Microsoft Windows (32bit), Linux (32 bit and 64 bit), Mac OS X.</p>	
EntréPad AES2501B	<p>Supported OS: Microsoft Windows (32bit), Linux (32 bit).</p>	
EntréPad AES4000	<p>The AES4000 fingerprint sensor is suitable for PC and mobile devices. Sensor's small size and low power is ideally suited for battery powered devices.</p> <p>Supported OS: Microsoft Windows (32bit), Linux (32 bit and 64 bit), Mac OS X.</p>	
FingerLoc AF-S2	<p>The AF-S2 fingerprint sensor is suitable for the embedded devices.</p> <p>Supported OS: Microsoft Windows (32bit), Linux (32 bit and 64 bit), Mac OS X.</p>	
LTT-C500 Fingerprint Sensor	<p>Supported OS: Microsoft Windows (32bit).</p>	<p>DLLs:</p> <ul style="list-style-type: none"> • FPSmm\FPSmmLighTunning.dll • FPSmm\GetImageC500.dll
Atmel FingerChip	<p>Supported OS: Microsoft Windows (32bit).</p>	<p>Drivers:</p> <ul style="list-style-type: none"> • \install\Fingerprint Scanners\AtmelFC\ <p>DLLs:</p> <ul style="list-style-type: none"> • FPSmm\FPSmmAtmel.dll • FPSmm\FingerChip.dll

Zvetco Verifi P4000	An USB 2.0 scanner based on AES4000 capacitive sensor. Supported OS: Microsoft Windows (32bit), Linux (32 bit and 64 bit), Mac OS X.	Drivers: <ul style="list-style-type: none">• \install\Fingerprint Scanners\AuthenTec DLLs: <ul style="list-style-type: none">• FPSmm\Additional\FPSmmAuthentec2501.dll
Zvetco Verifi P5000	A FIPS-201 compliant USB 2.0 fingerprint scanner. The scanner is based on the UPEK TCR1 capacitive sensor, that is also used in TCRU1C fingerprint scanner. P5000 scanner is rugged and scratch resistant. Scanner's sensor has protective coating that is able to withstand more than 10 million touches. Supported OS: Microsoft Windows (32bit).	Drivers: <ul style="list-style-type: none">• \install\Fingerprint Scanners\Upek DLLs: <ul style="list-style-type: none">• FPSmm\FPSmmUpek.dll• FPSmm\TCI.dll
ZKSoftware ZK6000	ZK6000 is an optical USB 2.0 fingerprint scanner. The scanner is able to reject latent and spoof fingerprints. Supported OS: Microsoft Windows (32bit).	Drivers: <ul style="list-style-type: none">• \install\Fingerprint Scanners\ZKSensor6000\ DLLs: <ul style="list-style-type: none">• FPSmm\FPSmmZKSensor6000.dll
CrossMatch L Scan Guardian	CroosMatch L Scan Guardian is live ten-fingerprints scanner. Supported OS: Microsoft Windows (32 bit) Remarks: Before starting the scanner its sensor should be cleaned, otherwise it will not be able to initialize. For 4 fingerprints scanning fingerprints segmentation module is required. This module is included only in MegaMatcher SDK.	Drivers: <ul style="list-style-type: none">• \install\Fingerprint Scanners\LScanEssentials\ DLLs: <ul style="list-style-type: none">• FPSmm\FPSmmCrossMatch.dll
Suprema BioMini	Suprema BioMini is a high performance USB fingerprint scanner. Supported OS: Microsoft Windows (32 bit) and Linux (32 bit)	Drivers: <ul style="list-style-type: none">• \install\Fingerprint Scanners\Suprema\ DLLs: <ul style="list-style-type: none">• FPSmm\FPSmmSuprema.dll
Suprema SFR300-S	Suprema SFR300-S is a high performance USB fingerprint scanner for fingerprint authentication in desktop or network security. Supported OS: Microsoft Windows (32 bit).	Drivers: <ul style="list-style-type: none">• \install\Fingerprint Scanners\Suprema\ DLLs: <ul style="list-style-type: none">• FPSmm\FPSmmSuprema.dll
Suprema SFR300-R	Supported OS: Microsoft Windows (32 bit).	Drivers: <ul style="list-style-type: none">• \install\Fingerprint Scanners\SupremaSFR300R\ DLLs: <ul style="list-style-type: none">• FPSmm\FPSmmSupremaSFR300R.dll

Suprema RealScan-D	Supported OS: Microsoft Windows (32bit)	Drivers: <ul style="list-style-type: none"> • \install\Fingerprint Scanners\Suprema\ DLLs: <ul style="list-style-type: none"> • FPSmm\FPSmmRealScan.dll Note: realscan.cfg configuration file should be created in FPSmm folder. When mode value is rolled one fingerprint can be scanned. When the value is flat, one, two or four fingerprints can be scanned.
Suprema RealScan-10	Supported OS: Microsoft Windows (32bit)	Drivers: <ul style="list-style-type: none"> • \install\Fingerprint Scanners\Suprema\ DLLs: <ul style="list-style-type: none"> • FPSmm\FPSmmRealScan.dll Note: realscan.cfg configuration file should be created in FPSmm folder. When mode value is rolled one fingerprint can be scanned. When the value is flat, one, two or four fingerprints can be scanned.
Suprema SFR3000	Supported OS: Microsoft Windows (32 bit).	Drivers: <ul style="list-style-type: none"> • \install\Fingerprint Scanners\Suprema\ DLLs: <ul style="list-style-type: none"> • FPSmm\FPSmmRealScan.dll
Futronic FS90	Supported OS: Microsoft Windows (32bit), Linux (32bit).	Drivers: <ul style="list-style-type: none"> • \install\Fingerprint Scanners\Futronic\ DLLs: <ul style="list-style-type: none"> • FPSmm\FPSmmFutronic.dll • FPSmm\ftrScanAPI.dll
SOP1	Supported OS: Microsoft Windows (32bit).	Drivers: <ul style="list-style-type: none"> • \install\Fingerprint Scanners\SOP1\ DLLs: <ul style="list-style-type: none"> • FPSmm\FPSmmSOP1.dll • FPSmm\sop1.dll
Vista MT	Supported OS: Microsoft Windows (32 bit and 64 bit)	Drivers: <ul style="list-style-type: none"> • \install\Fingerprint Scanners\VistaMT\ DLL: <ul style="list-style-type: none"> • FPSmm\FPSmmVistaMT.dll • FPSmm\VciMt.dll

LES Fingerprint scanner from Integrated Biometrics	Supported OS: Microsoft Windows (32 bit and 64 bit*) * This scanner supports only Windows 7 and 2008 64 bits OS.	Drivers: <ul style="list-style-type: none"> • \install\Fingerprint Scanners\Cyte\ DLL: <ul style="list-style-type: none"> • FPSmm\FPSmmCyte.dll • FPSmm\BioNetCapture.dll
Nitgen Fingkey Mouse I, II, III	Supported OS: Microsoft Windows (32bit and 64 bit) Remarks: FPSmmNitgen.dll from Additional folder should be copied to FPSmm folder in order to use this scanner driver.	Drivers: <ul style="list-style-type: none"> • \install\Fingerprint Scanners\NITGEN\ DLLs: <ul style="list-style-type: none"> • fpsmm\Additional\FPSmmNitgen.dll • fpsmm\NBioBSP.dll

2 Application

VeriFinger 6.2/MegaMatcher 3.1 Algorithm Demo is menu-driven software designed with intention to give the potential user a possibility to test our fingerprint image processing and recognition engine in action. Using Neurotechnology fingerprint recognition algorithm demo application mainly involves running fingerprint enrollment, enrollment with features generalization, verification and identification procedures, described below.

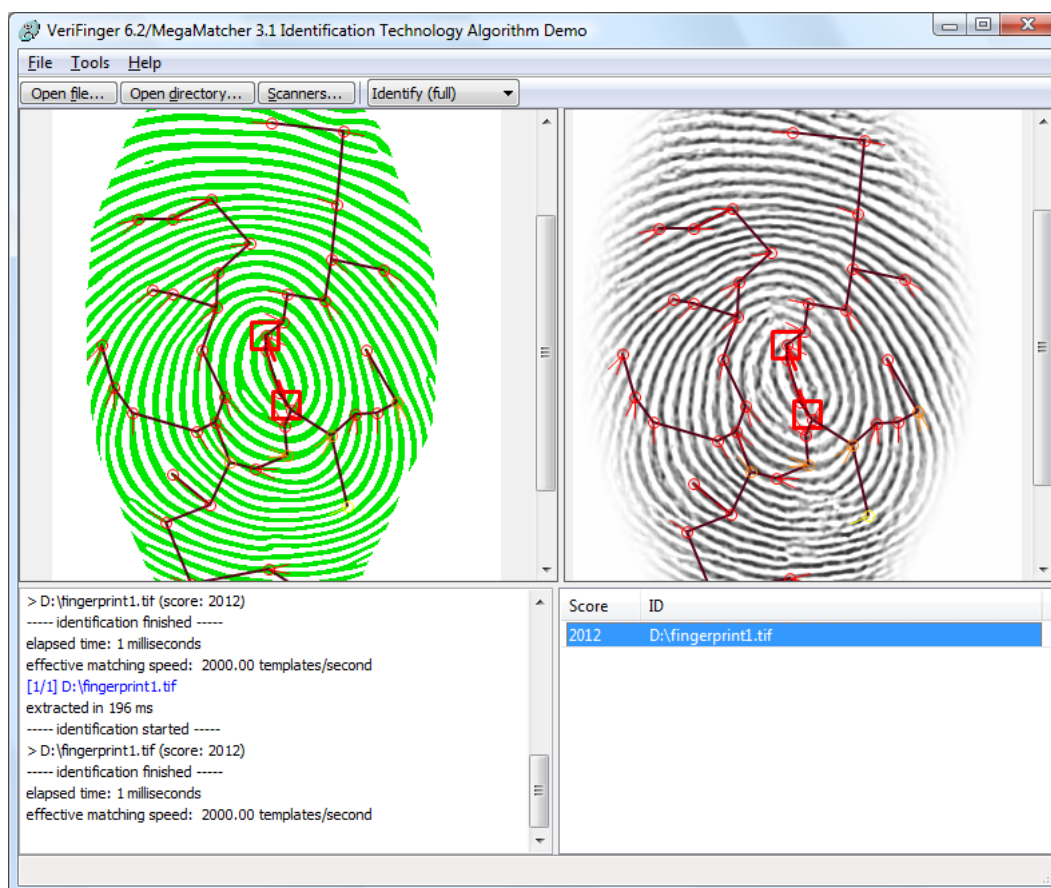
2.1 Windows

VeriFinger 6.2/MegaMatcher 3.1 Algorithm Demo application in Windows OS can be started from `FingersAlgorithmDemo.exe`.

2.1.1 Main Window

The main Neurotechnology fingerprint recognition algorithm demo window contains a menu bar at the top, and four child windows. In the top left window, the original fingerprint image is displayed, in the top right window, the same image after the image filtering/processing/feature extraction is shown with features and their directions marked in red by circles and lines. In the bottom-left window, enrollment and recognition information (enrolled/recognized file name, fingerprint processing and matching times, number of samples matched, etc.) is displayed. In the bottom right window, individual matching scores between different fingerprints (in identification mode) are displayed.

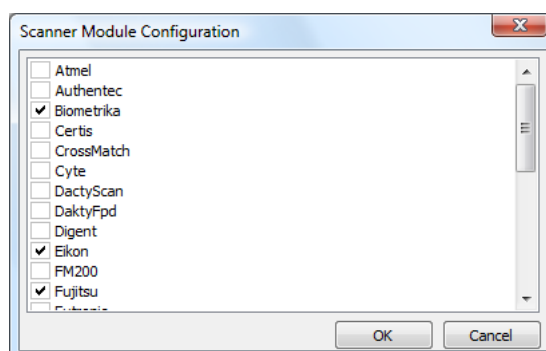
The VeriFinger 6.2/MegaMatcher 3.1 Algorithm Demo application's window:



(The right upper pane shows fingerprint image from database. The upper left pane shows extracted fingerprint features.)

2.1.2 Fingerprint Input

Neurotechnology fingerprint recognition algorithm demo allows reading fingerprints from all supported scanners (see page 1). Before using scanner please install scanner driver provided in demo drivers directory. Using "File->Scanners..." window you can choose which fingerprint scanners to use:



Neurotechnology fingerprint recognition algorithm demo software also allows reading fingerprint images from image files (either *.bmp, *.wsq or *.tif). There is a collection of sample fingerprint images (in *.bmp format) available for download from Neurotechnology web site (<http://www.neurotechnology.com/download.html>).

Fingerprint enrollment

For the fingerprint enrollment demonstration, select "Mode->Enroll" from the menu. Then, open file(s) or scan a fingerprint. To stop long enrollment operation choose "File->Cancel".

Note: When working with big number of image files file list can be created for later use.

Fingerprint enrollment with features generalization

For the fingerprint enrollment with features generalization demonstration, select "Mode->Enroll generalized" mode from the menu. Generalization requires multiple images. Image count can be changed in "Tools->Options...->Number of templates". Then open multiple files or scan multiple images.

Fingerprint Verification

Select "Mode->Verify" and open two files or scan two images.

Fingerprint Identification

For the fingerprint identification demonstration, select "Mode->Identify (fast)" or "Mode->Identify (full)" from the menu. Then open file(s) or scan an image to identify. Use fast identification when you want to achieve the maximum possible identification speed. When you need the maximum possible accuracy you should use full identification mode.

After the identification demo application will output the record names of the most similar fingerprint together with the similarity criterion (to see all matching result deselect "Stop on first result" in Options dialog (see page 15)) and various characteristics of the recognition process.

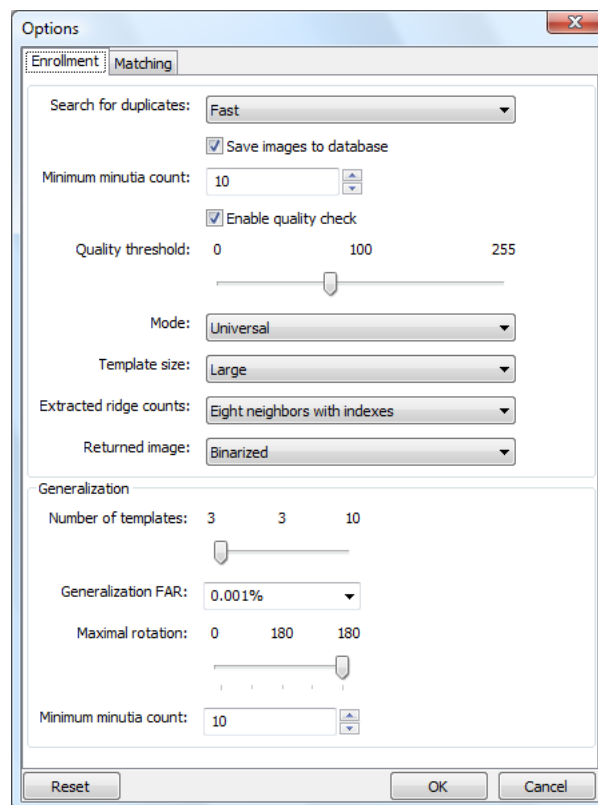
To stop lengthy enrollment or identification operations choose "File->Cancel".

Note: When working with big number of image files the file list can be created for later use.

2.1.3 Options Dialog

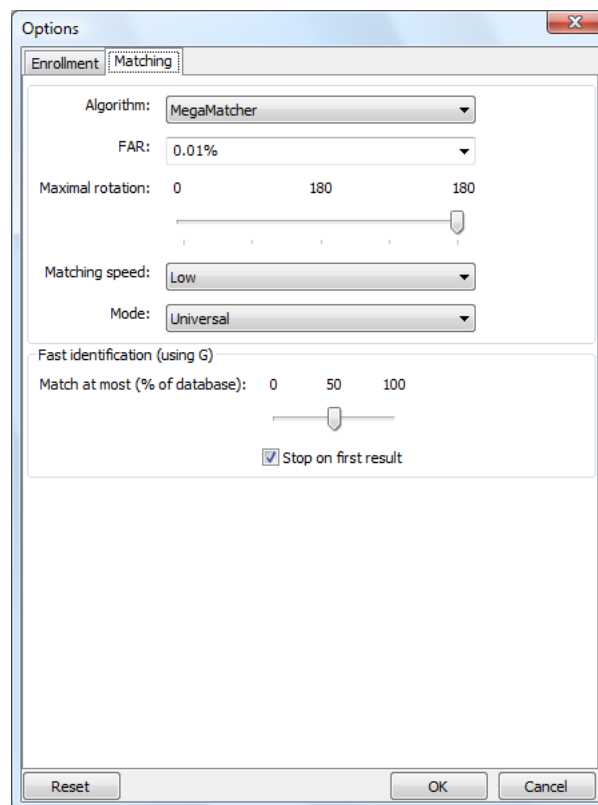
VeriFinger 6.2/MegaMatcher 3.1 Algorithm Demo allows to change various parameters of Neurotechnology fingers recognition algorithm. Algorithm parameters can be changed using Options window (*Tools->Options...*).

Fingerprints enrollment options



- *Search for duplicates* - controls duplicate search. This options is used to protect application from enrolling duplicate fingerprint images. It can be chosen between fast and full duplicates search. Full duplicates search is the most accurate and will find all duplicate fingerprint images. But full search can be inappropriate for big databases, because duplicate search can affect enrolling time. It is recommended to use fast duplicate search, which is not so accurate, but the search speed is greater. If duplicate search during fingerprints enrolling is not necessary, it can be switched off by selecting *Disabled* option.
- *Save images to database* - if checked, saves enrolled fingerprint images to database. During identification or verification saved fingerprint image can be used for displaying matching result.
- *Minimum minutia count* - minimum required minutia count for fingerprint to be enrolled to database.
- *Enable quality check* - if checked, fingerprint quality check is performed during enrollment. If fingerprint's quality threshold is less than specified value, fingerprint template will not be created.
- *Quality threshold* - controls how strict rules are applied when determining the quality of a fingerprint for extraction.
- *Mode* - used to select fingerprint features extraction mode optimized for particular scanner.
- *Template size* - size of fingerprint image templates. Can be used Large or Small template. It is recommended to use large template size.
- *Number of templates* - number of fingerprint template required for features generalization.
- *Generalization FAR* - generalization false rejection rate.
- *Maximal rotation* - maximal fingerprint's rotation value.
- *Minimum minutia count* - minimum minutia count required in each fingerprint used for generalization.

Fingerprints matching options



- *Algorithm* - used for selecting Neurotechnology product to test its fingerprint matching algorithm capabilities. VeriFinger 6.2/MegaMatcher 3.1 Algorithm Demo can be used to test MegaMatcher and VeriFinger algorithms.
- *FAR* - threshold that separates identical and different fingerprints. Matching threshold is linked to false acceptance rate (FAR, different fingerprints erroneously accepted as of the same) of matching algorithm. The higher is threshold, the lower is FAR and higher FRR (false rejection rate, same fingerprints erroneously accepted as different) and vice a versa.
- *Maximal rotation* - maximal fingerprint's rotation value.
- *Matching speed* - matching speed. Can be chosen Low, Medium or High speed. Default value is *Low*.
- *Mode* - used to perform matching optimized for a particular fingerprints scanner.
- *Match at most* - this option affects fast identification mode. It is used to define what part of existing database should be matched when duplicate search or identification is performed. The bigger part of database will be matched the bigger probability to find matching templates. Alternatively, the lower this value is, the greater matching speed is achieved. But the lower this value is, the bigger probability that template will no be found in database. When it is required the most accurate matching results it is recommended to use full identification (full identification performs matching within all database).
- *Stop on first result* - if checked, application stops matching when first result was found. Otherwise, all matching templates will be found (search will be perform through all database).

2.2 Linux

VeriFinger 6.2/MegaMatcher 3.1 Algorithm Demo application on Linux can be started from `FingersAlgorithmDemo` file. There are separate distribution for 32 bits and 64 bits operating system. See Windows (see page 13) part to find out how to use this application.

2.3 Mac OS X

VeriFinger 6.2/MegaMatcher 3.1 Algorithm Demo application on Mac OS can be started from FingersAlgorithmDemo.app file. See Windows ([see page 13](#)) part to find out how to use this application.

3 Distribution Content

VeriFinger 6.2/MegaMatcher 3.1 Algorithm Demo distribution contains these files and folders:

File/Folder	Description
/Drivers	This folder contains installation files and drivers for various fingerprint scanners. The folder name in this directory indicates a fingerprint scanner model.
/fpsmm	Files under this directory are drivers (libraries) for fingerprint scanners.
FingersAlgorithmDemo.exe	Fingerprint recognition algorithm demo executable file.

4 Support

If you encounter problems while installing or using Neurotechnology Iris Recognition Algorithm Demo application, please contact Neurotechnology (support@neurotechnology.com) or your local distributor.

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