

# MegaMatcher Case Study



## Bangladesh Voter Registration Duplicate Search System Implemented by the Bangladesh Army and Dohatec Based on MegaMatcher Technology

*Bangladesh selected MegaMatcher multi-biometric technology to identify duplicate registrations in the nation's voter database.*

**For Bangladesh, one of the most densely populated countries in the world, the creation of an accurate voter registration database has been a monumental task. The Bangladesh Voter Registration Project registered more than 80 million voters using biometric face and fingerprint technology. The next step was to accurately identify and remove all duplicate registrations in the voter database. After evaluating a number of biometric systems, Bangladesh determined that MegaMatcher identified more duplicate registrations with a higher degree of accuracy than any other system tested.**

The Bangladesh Election Commission, in partnership with the Bangladesh Army, established the Bangladesh Voter Registration Project to digitally register all legal voters in the country in advance of general elections in December 2008. The biometric registration of voters, which began in early 2007, resulted in a database that includes photographic and fingerprint records for 80 million voters.

With such a large database, the search for duplicates is a complicated task that requires a large number of matching operations and a high degree of reliability. The Bangladesh Army evaluated biometric identification systems from top vendors worldwide and selected **MegaMatcher** from Neurotechnology as the core multi-biometric technology for their voter registration duplicate search system.

### Background

- ◆ **The customer:** Bangladesh is the seventh most populated nation in the world.
- ◆ **The need:** With more than 80 million voters registered using biometric face and fingerprint technology, the Bangladesh Army was tasked with accurately identifying and removing all duplicate registrations in the voter database.
- ◆ **The solution:** Neurotechnology's MegaMatcher multi-biometric fingerprint and facial recognition technology was chosen as the core identification engine for Bangladesh's voter registration duplicate search system.
- ◆ **The integrator:** Dohatec was selected to help implement the voter registration duplicate search system. Based in Dhaka, Bangladesh, Dohatec provides software design and development services to corporations, institutions and government agencies.

***“Matching performed using MegaMatcher SDK could find more valid duplicate entries than any other SDK used for the same purpose.”***

Lt. Col.Md Mostafizur Rahman  
Staff Officer Grade - 1 (Information Technology Directorate), Bangladesh Army

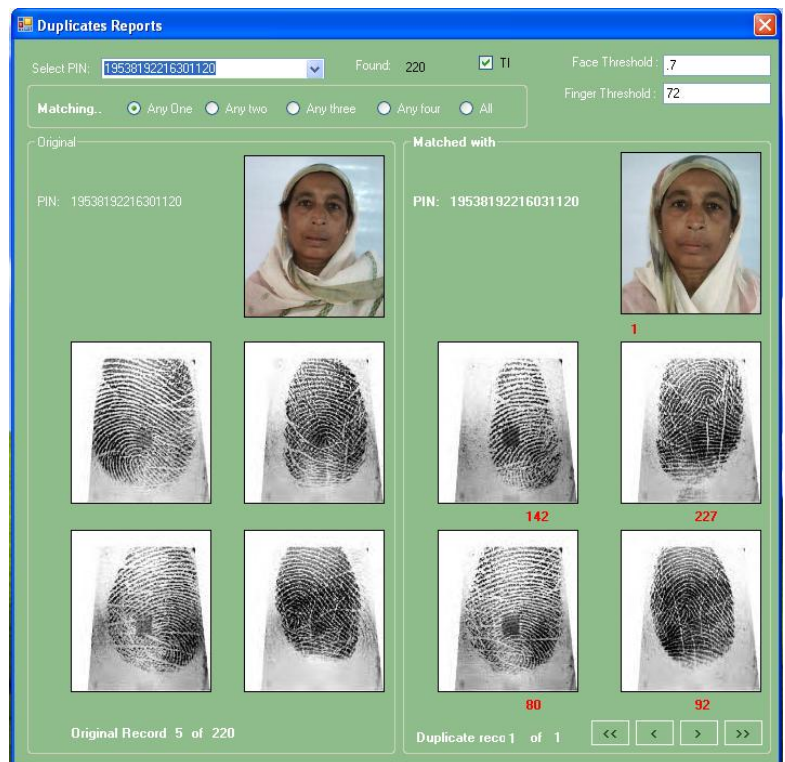
After deciding to use Neurotechnology’s MegaMatcher multi-biometric technology for their duplicate search system, the Bangladesh Army hired Dohatec New Media, a Dhaka-based provider of software design and development services, to design and implement the duplicate search system using the MegaMatcher Software Development Kit (SDK). Dohatec and the Bangladesh Army began implementing the MegaMatcher-based voter registration duplicates search system, known as Dohatec Biometrics Fusion Server©, in July 2007.

### **MegaMatcher-based Duplicate Search System Provides Fast, Accurate Results**

Bangladesh’s new voter registration duplicate search system uses MegaMatcher Client to generate templates from facial and fingerprint images captured with a BIO-Key® system. Depending on the size of the matching operation in a given jurisdiction, either MegaMatcher Server or MegaMatcher Cluster Server are then used to search the database and identify duplicate records.

#### **Key Benefits:**

- ◆ System helps ensure the administration of fair and democratic elections by verifying the accuracy of the country’s national voter database.
- ◆ MegaMatcher algorithm can rapidly and accurately identify duplicate face and fingerprint records in Bangladesh’s extremely large database.
- ◆ Fully automatic, robust, fault tolerant software manages a huge workload.
- ◆ The interoperability and flexibility of the MegaMatcher SDK enable the system to work easily with a variety of other software and hardware.
- ◆ MegaMatcher’s low cost-per-unit and low hardware system requirements enable a cost-effective solution for a rapidly developing nation.



***“MegaMatcher enhanced the technological capabilities of our system and the cost-per-unit for the SDK is cost-effective.”***

Lt. Col.Md Mostafizur Rahman  
Staff Officer Grade - 1 (Information Technology Directorate), Bangladesh Army

## **How the System Works**

### **Face and Fingerprint Capturing**

The voter information collected by the Bangladesh Army consists of face and four-finger fingerprint images along with personal demographic information of each and every person registered. To date, the project has captured face and fingerprint data for 80 million voters using a variety of input devices, including Logitech and ViMicro PC Cam Web cams for capturing face images and SecuGen Hamster III & Hamster IV, Identix DFR 2080, and DigitalPersona U.are.U 2000 fingerprint scanners. The BIO-key system stores the face and fingerprint images in a MySQL database in WSQ format.

### **Template Generation**

The Template Generation Module, based on MegaMatcher Client, reads the WSQ images from the MySQL database and generates fused face and fingerprint templates that are then stored in a SQL Server Database. MegaMatcher then uses these templates to carry out the biometric “N-to-N” matching process that identifies duplicates within the database records.

### **N-to-N Matching**

Dohatec’s implementation for Bangladesh carries out fusion matching by providing two options:

1. Fuse always
2. Face then fuse

The first option, “Fuse always” is for a complete N-to-N matching strategy which requires much more time than that of second option. “Face then fuse” means that the system first generates face score, and if the score crosses the threshold value then the respective finger template is matched. Due to the high speed of the MegaMatcher face matching algorithm, this process significantly reduces the amount of time required to identify duplicate entries.

***“...Neurotechnology is a well reputed solution for biometric matching. More so, the hardware requirement for using Neurotechnology’s product is minimum.”***

Lt. Col.Md Mostafizur Rahman  
Staff Officer Grade - 1 (Information Technology Directorate), Bangladesh Army

## Stand Alone Server and Cluster Server

The Bangladesh system runs on Microsoft Windows XP and Microsoft Windows Server with using a combination of MegaMatcher Server and MegaMatcher Cluster Server to conduct the duplicate search matching operations. The Single Server environment consists of a server machine, a server license, a client license and necessary software and data. The cluster server environment consists of a server machine, several cluster machines, a cluster server license, several cluster client licenses, and necessary software and data.

For biometric matching at the lowest level of administrative jurisdiction (e.g. a police station) stand alone Server is used. It has the capacity to match up to 500,000 records. Cluster Server provides significantly higher capacity depending on the number of Cluster Nodes used. For the Bangladesh system, Cluster Server is configured to match up to 5 million records at a time.

Cluster Server Specification:	Cluster Node Specification:
Processor: Intel Core Two Duo 1.97 GHz RAM: 4 GB Hard Disk: 500 GB OS: Windows XP Professional with Service Pack 2 Database: SQL Server 2000	RAM: 4 GB Hard Disk: 500 GB OS: Windows XP Professional with Service Pack 2

## Cluster Server Architecture

Dohatec's Fusion Server, based on MegaMatcher, is composed of 1 Cluster Server, 11 Cluster Node terminals and 1 Database Server. MegaMatcher permits the operation of two instances of Cluster Node process at a time in order to utilize 100% processor capacity in each node. For all practical purposes there are 22 Cluster Nodes.

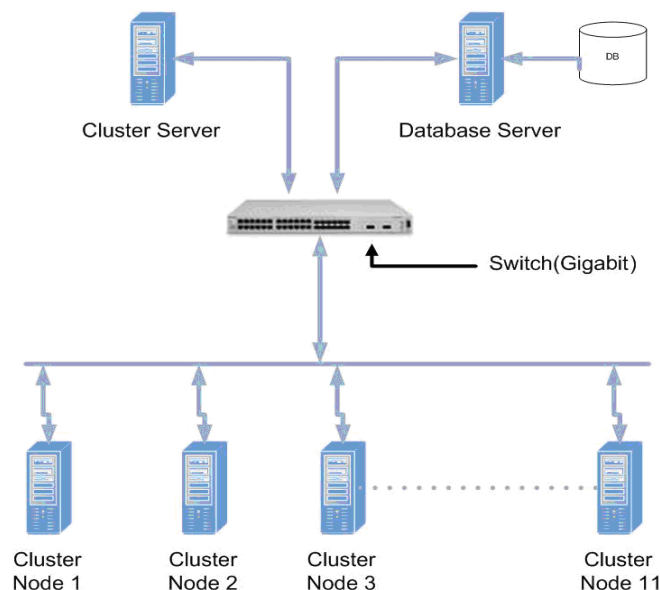


Figure 1: Cluster Server Architecture

*“At Neurotechnology they are prompt, transparent, less bureaucratic, trustworthy and informal in providing software solutions. For example, they posted their price in the website, which few such companies do. They were forthcoming, cooperative and helpful... They are cordial and prompt in giving customer support.”*

Lt. Col.Md Mostafizur Rahman  
Staff Officer Grade - 1 (Information Technology Directorate), Bangladesh Army

## About MegaMatcher

MegaMatcher SDK is designed for the development of large-scale automated fingerprint identification systems (AFIS) and multi-biometric face-fingerprint identification systems. MegaMatcher includes both fingerprint and face identification engines with a fusion algorithm that allows the two technologies to work together to provide very fast 1:N (1 to many) matching with even higher reliability than AFIS or facial recognition alone.

MegaMatcher's powerful fused algorithm can produce up to 400,000 matches per second on a single processor PC; and with MegaMatcher's fault-tolerant, scalable cluster software, this number can be multiplied across multiple PCs to perform extremely fast, parallel fingerprint and face matching using databases of practically unlimited size. MegaMatcher's latent fingerprint template editing capabilities also allow it to be used in forensic AFIS applications.

The MegaMatcher fingerprint engine has received full NIST MINEX Certification for use in U.S. government applications.

## About Dohatec

Dohatec provides high quality software design and development services to corporations, institutions and government agencies. The company develops customized information systems and implements solutions. Dedicated technical support engineers are assigned to customers to provide the highest quality of service. Dohatec has competence in multi-biometrics and integration. It is a Microsoft Gold Certified Partner and is recognized by Microsoft.

## For more information:

### Dohatec New Media

For more information about Dohatec and their products, go to: <http://www.dohatec.com>

### Neurotechnology

For more information about MegaMatcher pricing, product capabilities and specifications as well as other products from Neurotechnology, go to: <http://www.neurotechnology.com>

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