

TITLE:

FINGERPRINT SCAN OF THE DEAD: REAL-TIME IDENTIFICATION DURING SEARCH & RECOVERY IN LARGE-SCALE DISASTER

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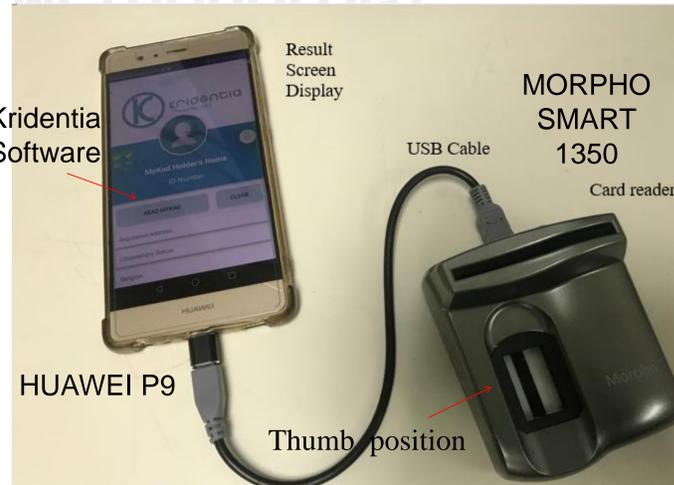
INTRODUCTION

The use of friction ridge prints (fingerprints, palm prints or footprints) analysis or fingerprint comparison is often the fastest method and most reliable means of primary identification in disaster victim identification (DVI) work [1].

OBJECTIVE

This paper demonstrates the possibility to perform DVI on-site with the concept of real-time fingerprint matching of the dead using a mobile and portable fingerprint biometric device where the thumbprint of the dead is readable within a given timeframe.

METHODOLOGY



- a) Materials: An optical fingerprint biometric reader, called the MorphoSmart model MSO 1350. The MSO 1350 is paired with the fingerprint application software version no. 2.0.7 developed by Kridentia Tech Sdn Bhd which is installed in an android Huawei P9 smartphone model EVA L19 used to display the information (Refer diagram beside)
- b) Field site: The field experiments were conducted in IPFN
- c) Subjects
 - A simple experimental study to engage 100 known deceased with available Malaysian Identity Card (MyKad) to match with own thumbprints
 - All non-medicolegal or non-police cases where the deceased are not subjected to a postmortem examination, are included in the study.

d) Study design

- A cross sectional study performed in the Department of Forensic Medicine, HKL for a period of 12 months from 1 January 2020 to 31 Dec 2020.
- A pilot study was done from 1 August to 31 December 2019 after ethical approval was granted in July 2019 in order to get a correct sample size.
 - ✓ 18 subjects were chosen (Refer Table below)
 - ✓ The population proportion, **p** is 14/18 = 0.78

$$n = p(1 - p) \left(\frac{Z}{E}\right)^2$$

e) Sample size (n=66): A total of 100 fingerprint scans collected.

NO.	Mean age (years)	Gender	Output scan	Total Pilot Study
1.	59	Male	Matched	8
2.	50	Female	Matched	6
3.	79	Female	Not matched	4

- f) Sampling method: A simple random sampling is used, whereby each individual is chosen entirely by chance and each member of the population has an equal chance of being included in the sample [2]. The plan is to estimate the proportion of successes in a dichotomous outcome variable which is either **Matched** or **Not matched** fingerprint scan in a single population.
- g) Ethical considerations: There was no harm inflicted to the dead body whereby the subject was used solely for matching thumbprint with MyKad.

STATISTICAL ANALYSIS: SPSS VERSION 26.0

The population data does not have a normal distribution curve: Non-parametric test

Chi Square test with Spearman Correlation

Male and female are equally likely to get a fingerprint match on the result output of the biometric scan

Chi Square test with Spearman Correlation

There is no relationship among age groups (21-40, 41-60, 61-80 and 81-100) and the result output of the biometric scan

Mann-Whitney U test with Spearman Correlation

There is no relationship between the duration from time of death to the time of scan performed with the result output of the biometric scan

Logistic Regression

To evaluate relationship among all the variables (gender, age group and duration from time of death to the time of scan performed) that may be contributing to the binary result output of the biometric scan

The relationship among all the three variables including gender, age group and post-mortem interval that may be contributing to affect the binary result output of the biometric scan were proven to be not significant at $p > 0.05$

FINDINGS: 100 SUBJECTS (56♂44♀)

Variables	Match	Not Match	Total
Male	52 (92.9%)	4 (7.1%)	56
Female	34 (79.1%)	9 (20.9%)	43
Total	86 (86.9%)	13 (13.1%)	99

1 female subject was excluded from this study due to a faulty chip in her MyKad

DISCUSSION

- Immediate capture of the biometrics of the dead victims by advancing digital technology is a paradigm shift in the DVI process.
- Rapid identification of disaster victims on-site is a new dimension in humanitarian forensic action as means of protecting the identity & dignity of the dead.

CONCLUSION

The data has proven that fingerprint biometric reader devices and its application which has been used for the living can also be used for the dead. Real-time fingerprint scans can assist in identification (DVI) for disaster related casualties.

ACKNOWLEDGEMENT

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REFERENCES

- INTERPOL, Disaster Victim Identification DVI Guide (2018).
- S. Lemeshow, D. Hosmer, J. Klar, S. Lwanga, Adequacy of sample size in health studies, World Health Organization (1980).

LIMITATIONS

- Subjects were all placed under a controlled environment (in freezers at temperature of 2 - 4°C).
- The MorphoSmart model MSO 1350 is only applicable to read the Malaysian Identity Card (MyKad) – foreigners excluded.