



**Diabetes Risk Level Prediction Using Data
Mining Techniques**

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الإهداء

إلى.. النخلة التي أثمرت روعي

إلى.. الجذع الذي حملنا معاً مكابراً وشامخاً

إلى كليهما وهما يحملاني على أكتاف الأمل ويحلقان بي بعيداً نحو سماء النجاح

لك وأنت تجد في عرسي داخل رحم الحياة

لك وأنت تتمخضين بي مراراً وتتمخضيني فرصة البدايات الجديدة على أعتاب النهاية

لكما وأنتما تتجرعان الكأس فارغاً لشقيانا ينابيع الحب

أمي .. أبي

وليتلك الروح التي علمتني بأن الحضور قد يعني الغياب المكتمل أو الرحيل الأبدي الذي لا تقاطعه عودة ولا يشوبه وصال

لروحك جدتي

إلى كل من منحني الدفاء في صقيع العربة وبزغ قمر إن تحالكت في عيني الدنيا

أهدي هذا الاجتهاد

شكر وإمتنان

(رَبِّ أَوْزِعْنِي أَنْ أَشْكُرَ نِعْمَتَكَ الَّتِي أَنْعَمْتَ عَلَيَّ وَعَلَىٰ وَالِدَيَّ وَأَنْ أَعْمَلَ صَالِحًا تَرْضَاهُ وَأَدْخِلْنِي
بِرَحْمَتِكَ فِي عِبَادِكَ الصَّالِحِينَ) (١٩) النمل

أشكرُ الله الذي أسبغ عليّ بفيض نِعْمه وواسع تَوْفِيقه وكرمه

ولمشرقي واستاذي الجليل الدكتور "عائش الحروب" الذي انتهلت من مناهل علمه ومعرفته دون ملل منه او كللوالذي
غمرني بفيض ثناءه وتشجيعه الذي كان عكازي في اشد لحظات التردد واعتي مراحل الضغط

لكل من اشعل قبساً للعلم في دربي .. اساتذتي الافاضل

لعائلتي التي ما برحت ان تكون لي سنداً وداعماً

احبائي واصدقائي وكل من وقف معي لتحقيق حلمي والتشبث به

واخيرا للروح التي تسكن اعماقي ولم تُضعفها عواصف اليأس ولم تُنتهها غيوم التقاعس والعجز .

DEDICATION

To the beloved lady who suffered, cared, and prayed for my success, my mother.

To the great man who always supported me in every step of my life ,my father.

**To the candles of my life; my brothers & sisters, and all the faithful friends for their unlimited
love and support, for all them, I dedicate this humble work.**

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Table of Contents

Dedication	V
Acknowledgments	VI
Table of Contents	VII
List of Tables	IX
List of Figures.....	X
List of Equation	XI
List of Abbreviations.....	XII
ABSTRACT.....	XIII
1 CHAPTER ONE (Introduction).....	1
1.1 Overview	1
1.2 Problem Statement.....	2
1.3 Research Questions.....	2
1.4 Aim and Objectives	2
1.5 Motivations.....	3
1.6 Significance	3
1.7 Scope	3
1.8 General Methodology	3
1.8.1.....	4
1.9 Using Data Mining Techniques and AI appellations for Diabetic Diagnostic	6
1.9.1 Level One (preprocess data).....	7
1.9.2 Level two (identify risk levels)	7
1.9.3 Level three (Learning).....	8
1.9.4 Level four (evaluations)	8
2 CHAPTER TWO (Background and Previous Work).....	9
2.1 Overview	9
2.2 Terminologies.....	9
2.2.1 Data mining	9
2.2.2 Big data	10
2.2.3 Machine learning (ML)	10
2.2.4 Fuzzy C-means	10
2.2.5 Classification.....	11
2.2.6 Deep Learning	12
2.3 Related works	13
2.4 Summary.....	20
3 Chapter Three (Proposed Approach)	22

2.1	Overview	22
3.2	Approach Design	22
3.2.1	Layer 1 (pre-process data).....	24
3.2.2	Layer 2 (identify risk levels)	31
3.2.3	Layer 3 (Learning)	34
3.2.4	Layer 4 (evaluation)	35
3.3	Summary.....	37
4	Chapter Four (Experience and discussions).....	38
4.1	Overview	38
4.2	Layer 1 (pre-process data)	38
4.2.1	Data collection.....	38
4.2.2	Data pre-processing.....	41
4.2.3	Features selection	43
4.3	Layer 2 (identify risk levels)	45
4.3.1	Clustering	45
4.3.2	Classification.....	46
4.3.3	Features selection	48
4.4	Layer 3.....	49
4.5	Layer four (evaluation).....	51
5	Chapter five (Conclusion and Future Works).....	52
5.1	Conclusion.....	52
5.2	Contribution.....	52
5.3	Future work.....	53
	References	54

LEST OF TABLES

Table 2-1 : Summary of related work.....	20
Table 3-1: Description of Data Set.....	24
Table 3-2: Risk matrix – Low level	33
Table 3-3: Confusion Matrix.....	35
Table 4-1:Deep Learning Result	50

List of figures

Figure 1-1: General Research Methodology to handle the Thesis.....	4
Figure 1-2: Layers of Approach.....	6
Figure3-1: Model of Approach.....	23
Figure 3-2: Data Pre-processing	28
Figure 4-1: Data Collection	39
Figure 4-2 : Input Data.....	40
Figure 4-3: Data View	40
Figure 4-4:Explore Data	41
Figure 4-5: Remove Attribute (Weight)	42
Figure 4-6 : Remove Attribute (Payer_code).....	42
Figure 4-7: Remove Attribute (medical specialty)	42
Figure 4-8: Remove Duplicate Instances	43
Figure 4-9 : Weight of Attributes.....	44
Figure 4-10: Clustering.....	45
Figure 4-11 Clustering	46
Figure 4-12: SVM Outcomes.....	47
Figure 4-13:Low Level Rule.....	48
Figure 4-14: Deep Learning Report.....	49
Figure 4-15: Deep Learning Report.....	50
Figure 4-16: Evaluation the Model.....	51

List of Equation

3-1 Correlation Equation.....	30
3-2 Accuracy Equation	36
3-3 Accuracy Equation	36

List of Abbreviations

#	Abbreviation	Full Expression
1.	AI	Artificial Intelligence
2.	CSV	Comma-Separated Values
3.	FCM	Fuzzy C-means
4.	GDA	Generalized Discriminant Analysis
5.	LR	Logistic Regression
6.	ML	Machine Learning
7.	NNs	Neural Networks
8.	SVM	Support Vector Machine.
9.	T2DM	Type Two of Diabetes Mellitus.
10.	UCI	University of California, Irvine.
11.	WEKA	Waikato Environment for Knowledge Analyze

Abstract

Big data faces many challenges in various aspects that appear through characteristics such as: volume, velocity, and variety; big data processes and analysis challenges acquiring quality information to support accurate decision-making values. Health care produces large amount of data by follow up the patients. This data can be used for diagnosing, detecting abnormal behavior and decision-making. Nevertheless, in critical fields that are directly related to human health care, the data must be treated in manner to overcome unwanted medical actions related to Big Data. Diabetics Big Data is rich in medical details, due to the frequency of updating case, and rich in gaps and unwanted data as well. Therefore, precise work on big data makes the diagnoses prediction of diabetics in terms of risk level possible. This prediction helps the doctor to overcome the ambiguous problem of the case in future and predict the optimal treatment at early stage of the case. In this work, an approach is proposed to pre-process the benchmark dataset UCI and select the correlated features based on target attribute. Fuzzy C-Means is used to values clustering and Support Vector Machine (SVM) is used for classification as well. Clustering and classification techniques are used to increase the clarity of data to enrich the rules that will be generated from dataset. Risk Matrix was proposed to represent rules of three levels of diabetes (low, high, medium), and use Risk Matrix to train deep learning and build an expert system that can predict the risk level automatically. The approach is tested in the fourth layer using the evaluation Metrics of machine learning algorithms. The approach experiments use Diabetes patient data and symptom in rapidminer tool. This approach Achieved 97.8% accuracy to automatically predict the level of risk and can be applied at the field of health care to target diabetic patients at variant levels of risks and provide customized care to reduce the re-admission rate.

Keywords: Big Data, Fuzzy C-Means, Diabetic, Healthcare, Support Vector Machine (SVM), Risk Matrix.