

A COMPARISON OF DECISION TREE, LOGISTIC REGRESSION, ARTIFICIAL NEURAL NETWORK AND RANDOM FOREST ALGORITHMS TO PREDICT SUICIDAL IDEATION AMONG YOUNG ADULTS IN MALAYSIA

(Penggunaan Algoritma Pepohon Keputusan, Regresi Logistik, Rangkaian Neural Buatan dan Hutan Rawak untuk Meramal Pemikiran Bunuh Diri di Kalangan Dewasa Muda di Malaysia)

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ABSTRACT

Suicide is a significant global public health issue, and Malaysia is no exception, with a high incidence rate. On average, approximately 10 suicide deaths occur daily in the country, alongside numerous attempted suicides. Hence, the key indicators for suicidal ideation should be identified so that communities can be aware of the characteristics of suicide attempters and assist them. Therefore, this study aims to develop predictive models using four predictive techniques, which are Decision Tree, Logistic Regression, Artificial Neural Network and Random Forest to anticipate suicidal ideation among young adults in Malaysia. By analysing key indicators, such as demographic, socio-economic, and psychological factors, the model seeks to enable proactive intervention and support for vulnerable individuals. A total of 33 predictive models are generated and evaluated based on their performance using the misclassification rate. Among these models, Gini decision tree models with 2 and 3 branches (80:20) showed superior performance, with the lowest misclassification rate recorded at 19.44%. Consequently, the model with 2 branches is selected for its practicality and accuracy in identifying vulnerable individuals. Early intervention is crucial in identifying and supporting young adults at risk of suicidal ideation. The developed predictive model offers valuable insights for proactive intervention and support, aiding in prevention efforts and reducing the prevalence of suicide. It carries significant policy implications for suicide prevention in Malaysia, enabling targeted intervention strategies for vulnerable young adults. By prioritising resources based on the identified risk factors, policymakers can enhance mental health support systems and prevent tragic outcomes.

Keywords: data mining; decision tree; prediction model; suicidal ideation among young adults; suicide

ABSTRAK

Bunuh diri adalah isu kesihatan awam global yang signifikan, dan Malaysia tidak terkecuali, dengan kadar kejadian yang tinggi. Secara purata, sekitar 10 kematian bunuh diri berlaku setiap hari di negara ini, di samping banyak yang cuba membunuh diri. Oleh itu, penunjuk utama bagi pemikiran bunuh diri perlu dikenal pasti supaya masyarakat dapat mengenali ciri-ciri individu yang cuba membunuh diri dan membantu mereka. Justeru itu, kajian ini bertujuan untuk membangunkan model ramalan menggunakan empat teknik ramalan iaitu Pepohon Keputusan, Regresi Logistik, Rangkaian Neural Buatan dan Hutan Rawak bagi meramalkan ideasi bunuh diri dalam kalangan dewasa muda di Malaysia. Dengan menganalisis penunjuk utama, seperti faktor demografi, sosio-ekonomi, dan psikologi, model ini bertujuan untuk membolehkan campur tangan proaktif yang lebih tepat dan memberi sokongan kepada individu yang berisiko. Sebanyak 33 model ramalan dihasilkan dan dinilai berdasarkan prestasi mereka menggunakan kadar ralat. Antara model-model ini, model Pepohon Keputusan indeks Gini dengan 2 dan 3 cabang (80:20) menunjukkan prestasi yang lebih baik, dengan kadar ralat terendah direkodkan pada 19.44%. Oleh itu, model dengan 2 cabang dipilih kerana kepraktisan dan ketepatannya dalam mengenal pasti individu yang berisiko. Pencegahan awal adalah sangat penting dalam mengenal pasti dan menyokong golongan dewasa muda yang berisiko mengalami pemikiran bunuh diri. Model ramalan yang dibangunkan ini menawarkan panduan yang berguna dalam

usaha pencegahan dan mengurangkan prevalens bunuh diri. Ia membawa implikasi dasar yang penting untuk pencegahan bunuh diri di Malaysia, membolehkan pengambilan tindakan yang disasarkan untuk golongan dewasa muda yang berisiko. Dengan mengutamakan sumber berdasarkan faktor risiko yang dikenalpasti, penggubal dasar boleh memperkukuhkan sistem sokongan kesihatan mental dan mengelakkan akibat yang tragik.

Kata kunci: perlombongan data; pepohon keputusan; model ramalan; pemikiran bunuh diri dalam kalangan dewasa muda; bunuh diri

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