Prediction of Purchase Intention for Medical Cannabis Products: Case Study in Medellín Colombia

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Abstracts: This article provides information on the level of acceptance of medical cannabis, the intention to use it and the factors involved in the decision-making process of individuals. Despite the studies developed for the use of medicinal cannabis, it has some difficulties to enter the market due to existing prejudices as a recreational drug. In order to provide valuable information to make the right decisions and generate marketing strategies, the relationships between the use of medical cannabis and the Theory of Planned Behavior in the purchase and consumption decision are explored using factor analysis techniques, and relevance analysis. Besides, a purchase intention prediction model based on machine learning is proposed. The results show that the dimensions ”attitudes” and ”perceived behavioral control” have a positive and statistically significant relationship with consumption and purchase. The purchase intention prediction model achieved a performance with an accuracy greater than 94%.

Keywords: Machine Learning, Marketing, Medicinal Cannabis, Purchase Intent, Theory of Planned Behavior.

1. INTRODUCTION

Cannabis has been seen by society as an illegal substance and is currently one of the most consumed psychoactive substances worldwide [3]. This has created a stigma for those people who choose to engage in cannabis use regardless of legality, but the perception of cannabis use is changing [8]. Several countries have legalized its use for different therapeutic and medicinal purposes [18].

In Colombia, the legal use of cannabis for medicinal purposes dates back more than three decades, through Law 30 of 1986, in which the National Narcotics Statute was adopted (Congress of the Republic, 1986), in which the use of these substances and the cultivation of plants that produce them for medical and scientific purposes is limited, resulting in the first step towards the legal use of these components to combat various diseases or conditions.

Over the years, a series of resolutions, laws and decrees have been implemented, which dictate the different requirements that currently exist in Colombia regarding medicinal cannabis. However, even though it has been regulated and its use is allowed, for many people it continues to be taboo, associating it in a negative way because it belongs to the recreational industry, produces hallucinogenic effects, and there is even a tendency to link it with addiction and drug trafficking [24].

Medical cannabis is a therapeutic option that could help control symptoms in palliative care patients who need it [25]. The increase in the use of medicinal cannabis worldwide has led to a great debate regarding its legalization [25]. However, lack of knowledge, limited training, cultural prejudices, among others, are also factors that influence the use of medicinal cannabis as a therapeutic option in medical practice [9]. Previous studies in physicians have revealed gaps in knowledge and shown a lack of confidence in prescribing it [22][25]. Other authors [6], notably conclude that the potential beneficial effect of cannabis is hindered by doctors’ lack of comfort in recommending it. Likewise, in [5], in a study with oncologists, show that 70% of them do not feel prepared to make clinical recommendations regarding medicinal cannabis, the vast majority talk to patients about this topic and almost half, in fact, clinically recommend it.

These results demonstrate the potential that cannabis has for medical use, however, there is a large gap between the studies and the knowledge to prescribe it. All this, added to a great misinformation about the benefits that cannabis has when used adequate, has a negative impact on the perception of these compounds, and, as a consequence, causes companies that are dedicated to producing these drugs to lose market opportunities, since within the five stages of the purchasing decision process, information plays a fundamental role in product selection and purchase. Therefore, it is important to carry out actions that improve the image of this type of products in order to encourage their commercialization and use, allowing companies in the sector to grow and sustain themselves over time.

Given that distorted beliefs lead to a consequent low perception of risk, and this plays a fundamental role in terms of behavioral intention, since people make decisions in situations (such as consuming or not) based on what their beliefs or ideas are. about the consequences they will have (positive or negative). For this reason, in this article an empirical study is carried out in the Aburr´a Valley in Antioquia, in order to identify the knowledge, perceptions and attitudes of people related to the use and consumption of medicinal cannabis. Based on the Theory of Planned Behavior (TPB), the constructs object of this study are identified, namely, subjective norms, attitude, perceived behavioral control or product perception and their influence on the intention to purchase products. based on medicinal cannabis. Additionally, a purchase intention prediction study using supervised learning machines was applied using the k nearest neighbor, support vector machine, decision tree and random forest algorithms, demonstrating the functionality of these models to determine purchase intention based on multiple variables. context and behaviour. This article is organized as follows: First, the theoretical framework and theories used to develop the hypotheses are discussed. The study sample, data and methodology are explained below. Finally, it reports the results, discusses the main findings and draws conclusions.

2. THEORETICAL BACKGROUND

2.1. Theory of Planned Behavior

The Theory of Planned Behavior (TPB) [1] provides a framework to explain and predict how people make their decisions, what their intentionality is and how they act in certain circumstances. TPB could be used to explain medicinal cannabis use in different populations [13]. TPB suggests that it is possible to predict people's behavior through their intention to perform certain actions and this is the most influential predictor of behavior [1]. Intentions affect individuals' choices as well as direct and maintain their behavior. Previous studies have assessed attitudes toward substance use [26] and explained substance use behavior [7] using TPB.

Behavioral intention is predicted using attitude (positive or negative evaluations of medicinal cannabis use), subjective norms (normative beliefs of the subject about what those in their social environment think about medicinal cannabis use) and behavioral control. perceived (perceptions of the ease or difficulty of controlling medicinal cannabis use) [10]. The sum of these variables aims to identify the individual's behavior before it is executed, indicating how willing they are to attempt a certain action, and even how much effort they are planning to exert, in order to perform the behavior. Likewise, TPB suggests that these three behavioral variables may be correlated and may positively influence an individual's purchase intention [1]. The more favorable the attitude and subjective norm regarding a behavior, and the greater the perceived behavioral control, the stronger the individual's intention to perform the behavior, in this case the intention to purchase medical cannabis.

The majority of published studies using TPB refer to recreational cannabis use and have indicated that attitudes, subjective norms and perceived behavioral control influence intentions to use cannabis [15] [12]. In line with these results, in [2] conclude that the behavior of consuming cannabis is significantly predicted by Behavioral Intention, which in turn was significantly predicted by attitude. and perceived behavioral control (p ¡ 0.001), while subjective norms do not seem to have a significant influence. However, in the context of the use and consumption of medicinal cannabis, the literature is still incipient. For this reason, this article aims to

explore the predictive effect of TPB variables (attitudes, subjective norms and perceived behavioral control) on the intention to consume medicinal cannabis in people in Medell´ın, Colombia.

Attitudes towards the consumption of medicinal cannabis are determined by the combination of beliefs about use, expectations of the result associated with use, the perception and influence of close people, the social context, motivating and inhibiting factors of behavior. In this sense, advertising plays an important role in the attitude towards use. This advertising is likely to be contrary to what has been the traditional anti-drug message and lead to more positive attitudes about cannabis, thereby reducing the perception of the physical and psychological risk associated with the use of medicinal cannabis. For this reason, it is expected that an individual with a more permissive attitude towards the use of medicinal cannabis will have a greater intention to purchase the product.

On the other hand, subjective norms involve the social environment of an individual in which an individual associated with that can add pressure to perform or not perform an action. Social environments that can affect these actions are family, friends, gender, political party, race/ethnicity, and education. Subjective norms are determined by two components: by the perception that other people important to the subject approve, think, expect and desire their behavior (normative beliefs); and the subject's own motivation to accommodate the expectations or desires of those people (motivation to adjust) (Facundo, Salas, Aguilar, Castillo, 2014). People who deviate from social norms and values are subject to disapproval, marginalization and, usually, discrimination with loss of their social status [4]. Subjective norms influence intention, as do descriptive norms and conventional norms that can assist an individual with regard to intention to use medicinal cannabis [16].

Although norms and attitudes contribute to intention to use cannabis, so do perceived behavioral controls on an individual's personal beliefs to act on a behavior. Behavioral control includes both internal and external factors. Among the internal ones are physical and psychological abilities, and in the external ones, time, opportunity, means and dependence on third parties. That is, the young person's perception of themselves as capable or not of using drugs or facing social pressure to do so. In this way, perceived behavioral control is the sum of the products between beliefs about the presence or absence of resources and opportunities to perform a behavior (control beliefs), and the perceptions of being able to control the factors that facilitate or hinder the behavior. behavior (perceived strength) (Facundo, Salas, Aguilar, Castillo, 2014).

Based on the previous arguments, we propose that the relationship between the TPB variables and the intention to consume cannabis is positive in the context of emerging countries, such as Colombia. Based on our previous discussion, we present the following hypothesis: H1: The attitude of the individual is positively related to the intention to purchase medicinal cannabis H2: Subjective norms of the individual are positively related to the intention to purchase medicinal cannabis H3: The individual's perceived behavioral control is positively related to the intention to purchase medical cannabis.

Figure 1 summarizes the research model developed in this study. The ”+” sign is used to emphasize the positive effect of each dimension of TCP on medicinal cannabis.

2.2. Support Vector Machine

Support vector machine (SVM) obtain an optimal hyperplane to separate classes using the structural risk minimization to maximize the distance between classes (margins) [23]. SVM can be used in binary and linear classification [20], and multiclass classification [17]. SVM was extended to regression (Support Vector Regression- SVR) to predict time series [19] [21].

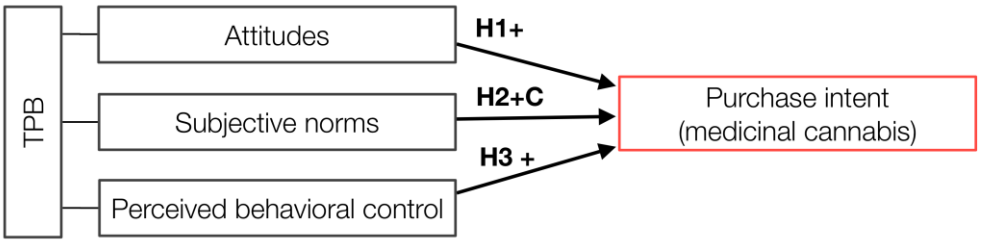

Fig.1. Proposed research model

The aim of this method is to use a training data $\mathbf{X} = \{(\mathbf{x}_1,y_1),(\mathbf{x}_2,y_2),...,(\mathbf{x}_l,y_l)\}$ to find a function that satisfies $f(\mathbf{x}_l) \approx y_l$. First, **x** is mapped to higher dimensional feature space in order to treat non-linear problems as linear problems. The regression problem can be depicted as follows:

$$|f(\mathbf{x};\mathbf{w}) - y| = \langle \mathbf{w}, \Phi(x) \rangle + b, \quad (1)$$

where $\Phi(\cdot)$ is the mapping function, and **w** and b results from minimizing the insensitive error (ϵ) between $f(\mathbf{x};\mathbf{w})$ and the observed values y:

$$|f(\mathbf{x};\mathbf{w}) - y|_\epsilon \{0 \text{ if } |f(\mathbf{x};\mathbf{w}) - y| < \epsilon; |f(\mathbf{x};\mathbf{w}) - y| - \epsilon, \text{ otherwise}\} \quad (2)$$

Kernel functions can be considered as the main potential of support vector techniques, which allow mapping a non-linear problem to linear problem [17]. This technique has other parameters which are widely explained in [14].

3. EXPERIMENTAL SETUP

3.1. Dataset

In this study, virtual questionnaires were applied in 10 cities in Colombia, specifically in the Aburrá Valley in the department of Antioquia. A non-probabilistic snowball sampling was carried out in the university academic sector, in which 113 men and 138 women responded, showing balance and reducing gender bias. All respondents are of legal age, the majority of the sample is made up of young adults (millennials) and are distributed among 36 university students (multiple careers), 182 employees (academic and productive sector), 22 independent workers, 4 unemployed, 5 businessmen and others.

Attributes In this study the dependent variable is purchase intention. The instrument used to measure this variable is the scale adapted from [11] which consists of 5 questions and the answers are given on a five-point Likert-type scale, ranging from: completely disagree (1) to completely agree (5). The factorial analysis is shown in Table 1

Table 1. Rotated component matrix for the variable purchase intention

Construct/indicator	Loadings	Composite Reliability	% of variance	Cronbach's Alpha
Factor 1: Purchase intention		13,027	73,372	0,979
I am willing to buy medicinal products based on Cannabis	0,742			
I would like to buy medicinal products based on Cannabis	0,682			
I intend to buy medicinal products based on cannabis	0,681			
In the future I will buy medicinal products based on cannabis	0,456			
Cannabis based medicinal products are likely	0,400			

Independent Variable. This study uses TPB as an independent variable. The TPB is composed of three variables: attitudes, subjective norms and perceived behavioral control. For these variables, a questionnaire of 35 questions adapted from [11] was used, with answers on a five-point Likert-type scale, ranging from: totally disagree (1) to totally agree (5) (for For example, Can I decide whether or not to buy medicinal cannabis-based products?

To analyze the study data, the Statistical Package of Social Sciences (SPSS), version 24, was used. Exploratory factor analysis was used through principal components analysis and the Varimax rotation method with Kaiser normalization, to reduce the number of elements to a more manageable level. The reduction resulted in 3 factors with eigenvalues greater than 1 and variance above 70% in each factor. For this study, reliability was maintained, reporting acceptable Cronbach's Alpha coefficients for each of the three dimensions: attitude =0.920, subjective norms =0.957 and perceived behavioral control =0.952. The KMO value is 0.949, with a Bartlett test significance of 99%. The average variance extracted (AVE) took values greater than 0.5, consistent with acceptable criteria (Fornell Larcker, 1981); Items with low loadings (< .5) were eliminated. Table 2 shows the results.

Table 3 presents the correlation matrix and descriptive statistics for each of the study variables. We can see that the correlation coefficients are not very high, indicating that our estimates do not suffer from collinearity between the independent variables. On a scale of 1-5, the purchase intention variable has a mean of 3.557 and among the TPB factors, the one with the highest score is the perceived behavioral control factor (μ=4.065) and the one with the lowest score is the subjective norms factor ((μ=1.788). Note: Table 3 contains Pearson's correlation coefficients. $*p < 0.05$; $**p < 0.01$.

Table 2. Rotated component matrix - independent variables

Construct/indicator	Loadings	Composite Reliability	% of variance	Cronbach's Alpha
Factor 1: Attitude		0.912	77.140	0,92
Buying a medicinal product based on Cannabis contributes to society	0,745			
Consuming alternative medicine based on Cannabis is ethically correct	0.734			
I think it is necessary to use medicinal products based on Cannabis	0,681			
The country should develop regulations that allow the sale of medicinal products based on Cannabis	0,578			
I think that buying a medicinal product based on Cannabis is a good choice	0,432			
Buying a medicinal product based on Cannabis contributes to the environment	0,484			
Factor 2: Subjective norms		0.929	77.741	0.957
I would buy Cannabis-based medicinal products if people close to me use this type of medicinal products	0.828			
I think that my friends or my family circle would agree with the use of medicinal products based on Cannabis	0.793			
The opinion of my family and important people in my life is relevant and influences my decision about the use of medicinal products based on Cannabis.	0.660			
The close and important people in my life would like me to buy Cannabis-based medicinal products.	0.595			
I would only use Cannabis-based medicinal products if they are recommended to me by people close to	0.446			

me.				
If a health professional recommended you use Cannabis-based medications, would you use them?	0.377			
Promotion (advertising) in the media would en- courage me to buy medicinal products based on Cannabis	0.235			
Factor 3: Perceived behavioral control		0.966	76.343	0,952
I can decide whether or not to buy medicinal cannabis-based products.	0,844			
The decision of whether or not to buy Cannabis- based medicinal products is solely mine.	0.738			
I will buy a Cannabis-based medicinal product if I want it.	0,702			
If I have the possibility of purchasing Cannabis- based medicinal products, I would do so in the future.	0,690			
I have enough knowledge to buy medicinal products based on Cannabis	0.379			
I am willing to buy medicinal products based on Cannabis	0.340			
There is enough variety in the market to choose different alternatives for medicinal products based on Cannabis.	0.232			

Table 3. Descriptive statistics and model correlations

Dimension	Mean	Deviation	1	2	3	4
Attitudes	3,579	0,560	1			
Subjective norms	1,788	0,644	-0.448**	1		
Perceived behavioral control	4,065	0,739	0.613**	0.693**	1	
Purchase intention	3,557	0,573	0.522**	0.307**	0.923**	1

3.2. Purchase intention prediction model

To predict the intention to purchase medicinal cannabis, different learning machine models were built following the procedure presented in Figure 2. First, the data set was cleaned, then a relevance analysis was carried out using the ReliefF algorithm. Finally, 4 prediction models were built, the first based on the k nearest neighbors algorithm, the second based on support vector machines, the third based on decision trees and the fourth based on the Random Forest algorithm. The performance of the models was validated with a test of 20% of the data and accuracy was used as a performance metric.

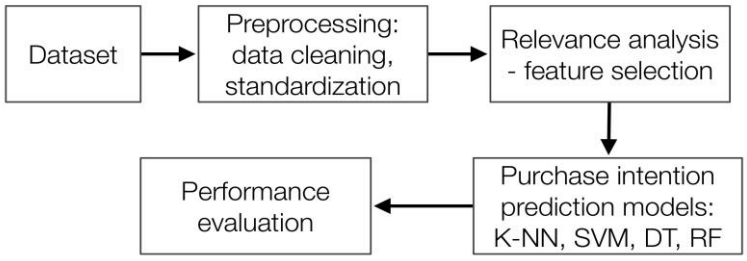

Fig.2. Methodology - purchase predictions models

4. RESULTS

Static data regression models were used to evaluate the hypotheses of this study based on multiple dimensions of TPB, taking purchase intention as the dependent variable, with several appropriate controls. Table 4 shows the effects of the regression analyzes for each independent variable, including the control variables. In each of the models presented, their variance inflation factors are below 5; indicates that the results obtained were not influenced by multicollinearity. The models show a good fit, supported by an R2 within the value and the F statistic. Gender shows a positive relationship with purchase intention, but it is not statistically significant in the 8 models of the study.

For Model 1, the "Attitudes" factor was used as an independent variable. The results show that the relationship between attitudes and purchase intention in the sample is positive and statistically significant (β = 0.351; p < 0.01), supporting Hypothesis H1. In Model 2, "subjective norms" were used as the independent variable. The results show that the relationship is positive but statistically insignificant (β = 0.309), rejecting Hypothesis H2. In Model 3, the results show a positive and significant relationship between perceived behavioral control and purchase intention (β = 0.409; p < 0.01), supporting Hypothesis H3.

Table 4. Linear regression model results

	Model 1	Model 2	Model 3
Constant	2.440 (0.33)**	2.691 (0.27)**	2.204 (0.30)**
Variable control			
Gender	0.077 (0.07)	0.042 (0.07)	0.076 (0.06)
Attitudes	0.351 (0.06)*		
Subjective norms		0.309 (0.04)	
Perceived behavioral control			0.409 (0.05)**
R2	0.244	0.266	0.296
F-static	7.49**	9.33**	11.78**
VIF	1.292	1.868	1.444

Note: The table includes regression model coefficients (estimators); Standard deviations are included in parentheses. Significant at $*p < 0.055$; $**$ $p < 0.01$; $***p < 0.001*$.

In Table 5 is shown the accuracy of the purchase intention prediction models based on machine learning applying the algorithms k-NN, SVM, DT, and RF. The best result was achived by SVM prediction model with 94.5% of accuracy. It can be due to the no-lineality of the data.

Table 5. Accuracy of purchase intention prediction models based on Machine Learning

Predictive model	k-NN	SVM	DT	RF
Accuracy	89.8%	94.5%	93.2%	94.1%

CONCLUSIONS

People's behavioral, normative, and control beliefs regarding the use of medicinal cannabis provided vital information about what motivates or does not motivate their use in the future, measured through purchase intention. The results still show that a large part of the population has a lack of knowledge about the use of medicinal cannabis, influenced by the negative perception associated with the use of recreational cannabis and its perception as an illicit drug.

The way people think, their attitude, the influence of their environment and their ability to acquire these types of products are essential so that stereotypes, paradigms, customs, tastes and traditions that currently exist in society can be broken with strategies of marketing that allow the growth and sustainability of medical cannabis companies, and all the actors involved in its manufacturing.

On the other hand, it was demonstrated that purchase intention can be predicted using learning machines based on multiple context variables, highlighting the performance of the model based on support vector machines.

As future work, it is proposed to expand the spectrum of the database and perform a clustering analysis that allows building predictors for each segment of the population to obtain decision support systems for better targeted marketing campaigns for medicinal cannabis.

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REFERENCES

[1] Ajzen, I.: The theory of planned behavior: Frequently asked questions. Human Behavior and Emerging Technologies 2, 314–324 (10 2020). https://doi.org/10.1002/hbe2.195

[2] Armitage, C.J., Conner, M., Loach, J., Willetts, D.: Different perceptions ofcontrol: Applying an extended theory of planned behavior to legal and illegal drug use. Basic and Applied Social Psychology 21, 301–316 (10 1999). https://doi.org/10.1207/15324839951036326

[3] Baron, E.P.: Comprehensive review of medicinal marijuana, cannabinoids, andtherapeutic implications in medicine and headache: What a long strange trip it's been .... Headache: The Journal of Head and Face Pain 55, 885–916 (6 2015). https://doi.org/10.1111/head.12570

[4] Bottorff, J.L., Bissell, L.J., Balneaves, L.G., Oliffe, J.L., Capler, N.R., Buxton, J.: Perceptions of cannabis as a stigmatized medicine: a qualitative descriptive study. Harm Reduction Journal 10, 2 (2013). https://doi.org/10.1186/1477-7517-10-2

[5] Braun, I.M., Wright, A., Peteet, J., Meyer, F.L., Yuppa, D.P., Bolcic-Jankovic, D., LeBlanc, J., Chang, Y., Yu, L., Nayak, M.M., Tulsky, J.A., Suzuki, J., Nabati, L., Campbell, E.G.: Medical oncologists' beliefs, practices, and knowledge regarding marijuana used therapeutically: A nationally representative survey study. Journal of Clinical Oncology 36, 1957–1962 (7 2018). https://doi.org/10.1200/JCO.2017.76.1221

[6] Carlini, B.H., Garrett, S.B., Carter, G.T.: Medicinal cannabis. American Journal of Hospice and Palliative Medicine® 34, 85–91 (2 2017). https://doi.org/10.1177/1049909115604669

[7] Collins, S.E., Carey, K.B.: The theory of planned behavior as a model of heavyepisodic drinking among college students. Psychology of Addictive Behaviors 21, 498–507 (12 2007). https://doi.org/10.1037/0893-164X.21.4.498

[8] Hall, W.: What are the policy lessons of national alcohol prohibition in the united states, 1920-1933? Addiction 105, 1164–1173 (3 2010). https://doi.org/10.1111/j.1360-0443.2010.02926.x

[9] Hill, K.P.: Medical marijuana for treatment of chronic pain and other medical and psychiatric problems. JAMA 313, 2474 (6 2015). https://doi.org/10.1001/jama.2015.6199

[10] Ho, S.W.C., WONG, Y.L., Chung, P.H.: A cross-sectional survey: Exploring future healthcare workers' intention to use cannabis through extended theory of planned behavior. Frontiers in Public Health 10 (8 2022). https://doi.org/10.3389/fpubh.2022.929016

[11] Huang, X., Ge, J.: Electric vehicle development in beijing: An analysis of consumer purchase intention. Journal of Cleaner Production 216, 361–372 (4 2019). https://doi.org/10.1016/j.jclepro.2019.01.231

[12] Ito, T.A., Henry, E.A., Cordova, K.A., Bryan, A.D.: Testing an expanded theoryof planned behavior model to explain marijuana use among emerging adults in a promarijuana community. Psychology of Addictive Behaviors 29, 576–589 (9 2015). https://doi.org/10.1037/adb0000098

[13] Korn, L., Haynie, D.L., Luk, J.W., Sita, K., Simons-Morton, B.G.: Attitudes,subjective norms, and perceived behavioral control associated with age of first use of cannabis among adolescents. Journal of School Health 91, 50–58 (1 2021). https://doi.org/10.1111/josh.12977

[14] Lima, A.R., Cannon, A.J., Hsieh, W.W.: Nonlinear regression in environmental sciences by support vector machines combined with evolutionary strategy. Computers & Geosciences 50, 136–144 (2013). https://www.sciencedirect.com/science/article/pii/S0098300412002269

[15] Waheed, M., & Jam, F. A. (2010). Teacher's intention to accept online education: Extended TAM model. Interdisciplinary Journal of Contemporary Research in Business, 2(5), 330-344.

[16] Malmberg, M., Overbeek, G., Vermulst, A.A., Monshouwer, K., Vollebergh,W.A., Engels, R.C.: The theory of planned behavior: Precursors of marijuana use in early adolescence? Drug and Alcohol Dependence 123, 22–28 (6 2012). https://doi.org/10.1016/j.drugalcdep.2011.10.011

[17] Mcmillan, B., Conner, M.: Using the theory of planned behaviour to understandalcohol and tobacco use in students. Psychology, Health Medicine 8, 317–328 (8 2003). https://doi.org/10.1080/1354850031000135759.

[18] Milgram, J., Sabourin, R., Sup´erieure, E.D.T.: aˆ´ €œ One Against One ˆa€ or aˆ€œ One Against All aˆ€: Which One is Better for Handwriting Recognition with SVMs ? aˆ€œ One Against One ˆa€ or aˆ€œ One Against All ˆa€: Which One is Better for Handwriting Recognition with SVMs ? (October) (2006)

[19] Moeller, K.E., Woods, B.: Pharmacy students' knowledge and attitudes regardingmedical marijuana. American Journal of Pharmaceutical

Education 79, 85 (8 2015). https://doi.org/10.5688/ajpe79685

[20] Muller, K.R., Smol a, A.J., Ratsch, G., Scholkopf, B., Kohlmorgen, J., Vapnik, V.: Predicting time series with support vector machines. In: Lecture Notes in Computer Science (including subseries Lecture Notes in Artificial Intelligence and Lecture Notes in Bioinformatics) (1997). https://doi.org/10.1007/bfb0020283

[21] Salimi, A., Ziaii, M., Amiri, A., Hosseinjani, M., Karimpouli, S.: The Egyptian Journal of Remote Sensing and Space Sciences Using a Feature Subset Selection method and Support Vector Machine to address curse of dimensionality and redundancy in Hyperion hyperspectral data classification. The Egyptian Journal of Remote Sensing and Space Sciences 21(1), 27–36 (2018). https://doi.org/10.1016/j.ejrs.2017.02.003

[22] Smola, A.J., Scho¨lkopf, B.: A tutorial on support vector regression. Statistics and Computing 14(3), 199–222 (2004). https://doi.org/10.1023/B: STCO.0000035301.49549.88, https://doi.org/10.1023/B:STCO.0000035301. 49549.88

[23] Takakuwa, K.M., Shofer, F.S., Schears, R.M.: The practical knowledge, experienceand beliefs of us emergency medicine physicians regarding medical cannabis: A national survey. The American Journal of Emergency Medicine 38, 1952–1954 (9-2020). https://doi.org/10.1016/j.ajem.2020.01.059

[24] Vapnik, V.N.: The nature of statistical learning theory. Springer (2000)

[25] Weatherburn, D., Jones, C., Donnelly, N.: Prohibition and cannabis use in australia: A survey of 18- to 29-year-olds. Australian New Zealand Journal of Criminology 36, 77–93 (4 2003). https://doi.org/10.1375/acri.36.1.77

[26] Whiting, P.F., Wolff, R.F., Deshpande, S., Nisio, M.D., Duffy, S., Hernandez,A.V., Keurentjes, J.C., Lang, S., Misso, K., Ryder, S., Schmidlkofer, S., Westwood, M., Kleijnen, J.: Cannabinoids for medical use. JAMA 313, 2456 (6 2015). https://doi.org/10.1001/jama.2015.6358

[27] Zemore, S.E., Ajzen, I.: Predicting substance abuse treatment completion using anew scale based on the theory of planned behavior. Journal of Substance Abuse Treatment 46, 174–182 (2 2014). https://doi.org/10.1016/j.jsat.2013.06.011

DOI: https://doi.org/10.15379/ijmst.v10i3.3392