SELECTING FEATURES RELATED TO WORK-PRESSURE AND ASSESSING POSSIBLE DISEASES IN HUMANS

S. ANITHA, DR. M. VANITHA

ABSTRACT: MILLIONS SUFFER FROM CHRONIC PAINFUL CONDITIONS DUE TO WORK PRESSURE. WORK PRESSURE IN JOBS AT WORKPLACE IS OF CRUCIAL IMPORTANCE TO THE HEALTH OF EMPLOYEES. WORK PRESSURE CAN HAPPEN DUE TO A VARIETY OF REASONS. EMPLOYEES NEED TO HANDLE PRESSURE WHILE MANAGING TASKS ALLOTTED TO THEM OR DUE TO A BURDENED RESPONSIBILITY. THOUGH STRESS DUE TO WORK-PRESSURE HAS BEEN ASSOCIATED AS A FEMININE TRAIT OF WEAKNESS, THUS ALLOWING PEOPLE TO ADMIT STRESS. THE PRESSURE IN THE WORKPLACE CAN TAKE DIFFERENT FORMS DEPENDING ON THE POSITION, ORGANIZATION AND MANAGEMENT. WHILE ENCOUNTERING WORK PRESSURE EMPLOYEES EITHER WORRY OR ARE ANXIOUS FOR COMPLETING THEIR TASKS OR ASSIGNMENTS. THIS PRESSURE OR ANXIETY OR DEPRESSION FOR FEAR OF NOT COMPLETING THE TASK CAN CULMINATE IN CHRONIC ILLNESS. MANY AT THE WORKPLACE HAVE REPORTED INCIDENCES OF ILLNESS LEADING TO HYPER TENSION, DIABETES, INCREASED BLOOD PRESSURE AND STROKES. THOUGH A MIXTURE OF PERSONAL, ORGANIZATIONAL AND INDIVIDUAL FEATURES RELATED TO WORK-PRESSURE WERE STUDIED, THE STUDIES DID NOT CAPTURE ALL FACTORS TOGETHER AND EMPHASIZED WORKPLACE CHANGES OR LIFESTYLES, THIS WORK EXPLORES MULTIPLE FACTORS. THIS PAPER PROPOSES A FEATURE SELECTION TECHNIQUE CALLED FEATURE SELECTOR FOR IDENTIFYING WORK PRESSURE (FSWP) WHICH CAN BE USED FOR BY CLASSIFICATION TECHNIQUES FOR FURTHER PROGNOSIS OF DISEASES PREVALENT BUT HIDDEN IN WORKERS.

KEYWORDS: PRESSURE MANAGEMENT, RANDOM FOREST, WORK PRESSURE, DIABETES, BLOOD PRESSURE

1. INTRODUCTION

Work-Pressure is very common in many institutions around the globe. Though Work-Pressure may look a normal ailment, it is estimated economic losses amount to around fourteen million pounds Britain alone between 2013 and 2014 [1]. Work-Pressure can lead to mental, physical illness and psychological pressure [2] [3] [4]. Figure 1 depicts Stress due to work-pressure in the Human Body.

Stress. It is the way to guard against injury and pain. Body muscles tense up and then get released when the pressure passes as they are in constant state of vigil. Muscles tightness for long periods of time can trigger other reactions in the body or may encourage Work-Pressure related disorders like migraine headache, blood pressure increase, increased kidney functions etc. A few complications that can occur in humans due to Work-Pressure are detailed below

- Respiratory system: Work-Pressure can result in rapid breathing or shortness of breath when the passage between the nose and the lungs constricts. It can also lead to asthma attacks.
- Cardiovascular: Acute Work-Pressure like sudden breaks while driving or meeting deadlines in office causes an increase in heart rate and stronger contractions of the heart muscle where Stress hormones act as messengers. Constant Work-Pressure for a prolonged period can result in problems for heart and blood vessels.
- Endocrine: In a challenging situation, the human brain initiates an increase in the production of steroids or Stress hormones or an increase in glucose and fatty acids from the liver. This can result in the development of numerous physical and mental health conditions, including chronic fatigue, metabolic disorders (e.g., diabetes, obesity), depression and immune disorders.
- Nervous system: When a body is Stressed due to heavy work-pressure, sympathetic nervous system handles it a fight or flight response with increased hormones release resulting in the heart to beat faster, increased respiration rate, dilation of blood vessels in the arms and legs and increased glucose levels in the bloodstream. This can cause several ailments in humans. Moreover, Work-Pressure is known to cause dysfunctions in Sexual desire, Reproduction and Menstruation in females.

Work-Pressure Management: The definitions of Stress also vary in research literature. There have been multiple conceptualizations of Stress due to work-pressure based on social, personal, environmental and work-related factors [8].

---

**Fig. 1 – Stress in the Human Body**

The sudden rise in Work-Pressure has also been linked to recession and job insecurity at both the national and global levels [5] [6] [7]. When the human body is stressed, muscle tension is the first reflex reaction to this

- PH.D RESEARCH SCHOLAR, DEPARTMENT OF COMPUTER APPLICATIONS, ALAGAPPA UNIVERSITY, KARAIKUDI, INDIA.
- Assistant Professor, Department of Computer Applications, Alagappa University, Karaikudi, India.
- (E-mail: nathan.anitha@gmail.com)
Managing stress due to work-pressure can be in three levels. [9]. At the initial level factors of Stress due to work-pressure are handled, at the next level, the severity of symptoms are reduced. The final level of managing this stress is rehabilitation [10]. A study [11] found that managing individual stress had greater effects when compared to managing organizational stress. Though Work-Pressure management can reduce the negative effects of Work-Pressure on health, an early indication of Stress due to work-pressure in the body can help prevent or treat diseases in advance. This work identifies Work-Pressure parameters that can cause ailments in humans from a predefined dataset (VASA Dataset[12]). The proposed method FSIWP is non-invasive and can help workers identify Work-Pressure in them.

2 FEATURE SELECTOR FOR IDENTIFYING WORK PRESSURE (FSIWP)

FSIWP uses the VASA dataset collected by questioning individuals on different work Stress related factors and their personal demographics. The participants belonged to different level of management in organizations including the lowest level workers. The sample has details on 49 employees in different ages and positions. A few of the questions used are listed as a Figure in Figure 2.

The data from VASA dataset has many physical examination indicators for persons likely to be affected by work-pressure. Dimensionality reduction is followed in this work as the number of features is directly proportional to performance times. After reducing the features, FSIWP calculates the weight of each feature and eliminates the minimum weight features updating the resultant set. The features are then arranged in a reverse ascending order. FSIWP uses decision trees on this sorted order as they are easy to comprehend in Machine learning techniques. Decision trees follow a simple divide and conquer strategy which is used recursively. The main of using decision trees in FSIWP is to find strong generalizations in features. Thus FSIWP trains the feature subsets through cross-validation and evaluates the arrived subsets for finding the optimal feature subset.

3. FSIWP RESULTS

Table 1 lists the original set of parameters taken for the study and evaluating FSIWP.

![Fig. 2 – VASA Dataset Questionnaire](image-url)

![Fig. 3 – FSIWP Architecture](image-url)
FSIWP uses cross-validation to preserve the best performing characteristics and thus obtain the optimal number of features by extracting from the VASA dataset. The feature subset selection is affected by Decision tree combined used with RFE and the performance evaluation criteria of the decision tree. The most significant features thus selected by FSIWP in order of importance by the automated algorithm included Age, Sex, Working hours, Work Stress, Addiction, Food, Sleeping hours, Blood Stress, Body Weight and Control over life. The results are evaluated according to the AUC and F1 measures. The measures of True positive (TP), true negative (TN), false positive (FP) and false negative (FN) are used in this work. The FSIWP confusion matrix is listed in Table 2.

<table>
<thead>
<tr>
<th>Features</th>
<th>AUC Measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>+ve</td>
<td>-ve</td>
</tr>
<tr>
<td>Positive Classification</td>
<td>TP</td>
</tr>
<tr>
<td>Negative Classification</td>
<td>FP*</td>
</tr>
</tbody>
</table>

Since any classifier can be used with RFE, SVM and RF were used for comparisons. The results of F1 measure and AUC are tabulated in Table 3 while Table 4 shows comparative performances of classifiers in feature selection.

**Table 3 - Optimal feature subsets of each classifier**

<table>
<thead>
<tr>
<th>Measure</th>
<th>SVM</th>
<th>C4.5</th>
<th>RF</th>
<th>FSIWP</th>
</tr>
</thead>
<tbody>
<tr>
<td>F1 Measure</td>
<td>18</td>
<td>13</td>
<td>12</td>
<td>10</td>
</tr>
<tr>
<td>AUC</td>
<td>12</td>
<td>12</td>
<td>11</td>
<td>10</td>
</tr>
</tbody>
</table>

**Table 4 - Prediction performance on optimal feature subset**

<table>
<thead>
<tr>
<th>Measure</th>
<th>SVM</th>
<th>C4.5</th>
<th>RF</th>
<th>FSIWP</th>
</tr>
</thead>
<tbody>
<tr>
<td>F1 Measure</td>
<td>0.726</td>
<td>0.891</td>
<td>0.899</td>
<td>0.905</td>
</tr>
<tr>
<td>AUC</td>
<td>0.680</td>
<td>0.893</td>
<td>0.897</td>
<td>0.972</td>
</tr>
</tbody>
</table>

Table 4 implies F1 measure of FSIWP is 0.905, and AUC is 0.972. Next is RF with F1 measure of .899 and AUC .897, third is the C4.5 decision tree with F1 measure of .891 and AUC .893. SVM is the worst performance classifier is SVM with F1 measure of .726 and AUC .680. Figure 4 depicts FSIWP comparative performance.
4 CONCLUSION

Organizational steps to manage work-pressure and stress are perceived to be effective, though managing this phenomena needs personal attention. Though the generic feeling that work-pressure needs handling is true, individuals need to understand and accept that work-pressure needs to be handled personally. This exploratory study consisting of 49 individuals has proposed and implemented a framework where work-pressure related stress can be identified for effective management. It can be concluded that the proposed system FSIWP can be used for determining Stress factors in workers early from a dataset demonstrated by its results.

ACKNOWLEDGMENT

This research work has been supported by RUSA PHASE 2.0, Alagappa University, Karaikudi.

REFERENCES


[Google Scholar]
