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A Framework for Evaluating Personal Behavioural Interviews

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Abstract— Personal Interview is the integral part of recruitment process which is carried out to judge the suitability of the candidate's behavioural attributes to the offering post. In this paper, we propose a framework that can be helpful in the selection processes like SSB interviews conducted for Defense Services in India. The idea is to perceive the nonverbal communications from the candidate by the psychologist observer and transfer / code these observations in the form of a signal waveform on a computer in real time through real time plotter (data visualization). The waveform is synchronized with real clock time. This signal is analyzed using a computation model that computes the value for behavioural variable on a point scale 0-10 for the overall assessment of the Interviewee from psychological and behavioural perspective for the selection / hiring purpose. The framework offers a simple and elegant solution to objective assessment of overall personality of a candidate. The proposed framework can be easily customized as per the requirements and set policy. This work is the first of its kind for it demonstrates a novel application of signal processing in the field of behavioural assessment.

Keywords—Signal Processing; Behaviour Science; Tool for Personal Interview; Behaviour Coding; Behavioural Variable

I. INTRODUCTION

Psychological and behavioural interview is of prime importance in certain services like defense since the objective of interview is to select candidates with a specific set of attributes. Unlike subjective, knowledge based interviews, psychological and behavioural interviews pose greater challenges in assessment of the candidate. In subjective interview, assessment is based on how nicely, the candidate has given answers to the posed questions and how many are correct. In Psychological and behavioural interview the candidate is assessed during each fraction of second for the duration of the interview. In other words, subjective interviews are assessed using some discrete process whereas the assessment of behavioural interviews is a continuous process. Each and every moment of the interview duration is equally important in such assessments. Assessments are generally based on behavioural attributes of candidate as evident from various inputs like his face expression, body language, gesture, eye contacts, confidence in communications etc. As the interview goes on, the psychological expert keeps observing the candidate for behavioural inputs from him / her and on the basis of these inputs, an overall assessment of the candidate is made. But now the question is, will the observer be able to keep in his mind each and every observation from start to end of the interview session to incorporate them in the overall assessment? A computer assisted tool can be much helpful in such cases as the observer can use its GUI to plot or mark the candidate behaviour in exact chronological order. This coded information can be used to compute the overall performance of the candidate.

Efforts have been made to assess face expressions, emotions, gesture, body language etc. using image processing techniques separately. But when it comes to overall assessment of an interviewee from psychological and behavioural point of view, it becomes very difficult to integrate these techniques to achieve a workable solution as they are complex techniques in themselves and they are not full proof and robust. As a result, there is a wide gap in the working tools for the purpose.

It is a well known fact that computational tasks can be better handled by computers than by human. Contrary to this, there are certain tasks where human beings excel computers e.g. perception, cognitive tasks etc. Providing the computers capabilities to perform this category of tasks is the concern of Artificial Intelligence. Such tasks are complex and difficult to be handled. Scientists have been continuously trying to empower computers with this type of capabilities. The question is, have we optimized our computers for tasks of earlier category in which they excel to human beings? On the flip side, have we optimized our capabilities as human beings before subletting our designated tasks to computers for which 'they' are not fit? This paper tries to explore such issues also in its approach by maintaining a fine balance in work division between the two based on their primary capabilities.

SSB (Services Selection Board) test process is reckoned as one of the toughest test in the world for the selection of defense personnel. The personal interview in SSB selection process is the psychological assessment of candidate by the Interviewing Officer (IO). The IO already has on his hands candidate's filled self description form, results of psychological written test, group task, individual tasks with comments before the candidate is called inside the room. Thus, the job of IO is just to cross check the candidate by triggering some questions and get the responses from the candidate to judge his personality. Besides, the candidate also exposes some of his personality facets through non verbal communications during the communication that can be interpreted by a psychologist expert.

Thus, personal interview in SSB examination is close integrated with the remaining tests. SSB selection system is no doubt comprehensive and exhaustive, it may be improved further if some decision making system is incorporated with the existing system. Indian defense system is at present facing with acute shortage of manpower. An objective manpower selection process may be somewhat helpful to improve the scenario. Here, in this paper, we propose a framework for objective evaluation of candidate's performance in SSB interviews. As this is an ongoing project at an early phase, the framework is described through a prototype.

II. EXISTING APPROACHES

Attempts have been made to develop decision support systems for selection process using various approaches like heuristic method[1], fuzzy logic[2][3][4], rough set theory[5] etc. Saat et al [6] proposed a decision support system framework to profile the candidates on the basis of selection criteria. A work on automatic personality perception based on prosodic features including non verbal speech features has been described in [7]. Ali M. et.al [8] suggested a solution for Human Resource Personnel using association rule mining (ARM) technique of data mining.

de Figueiredo, Rui J.P.[9] presented an approach to predict the behaviour of complex human/animal/machine systems based on cognitive signal processing. "cognitive signal" implies a behavioural variable that is expressed as a waveform or a time series associated with a complex system. The waveform is driven by human and/or animal cognitive/perceptual skills. A new modeling method of human behaviour based on multi-dimensional time series sensing data and Hidden Markov Model (HMM) is presented in [10]. Fang-Hsuan Cheng[11] proposed a new human behaviour description model based on action recognition based on events produced when pedestrians pass through cross-road as example.

III. PROPOSED SYSTEM ARCHITECTURE

Figure 1 describes the conceptual diagram for the proposed system. Inputs to the behavioural assessment system are obtained from candidate self description form and previous test reports that are made available to the interviewer. Verbal and non verbal communications made during the interview are also input to the assessment system. As the behavioural attributes are computed, a computation model based on rough set theory makes final assessment for the behavioural variable. A machine learning module takes an account of previous rules to be incorporated into the evaluation system.

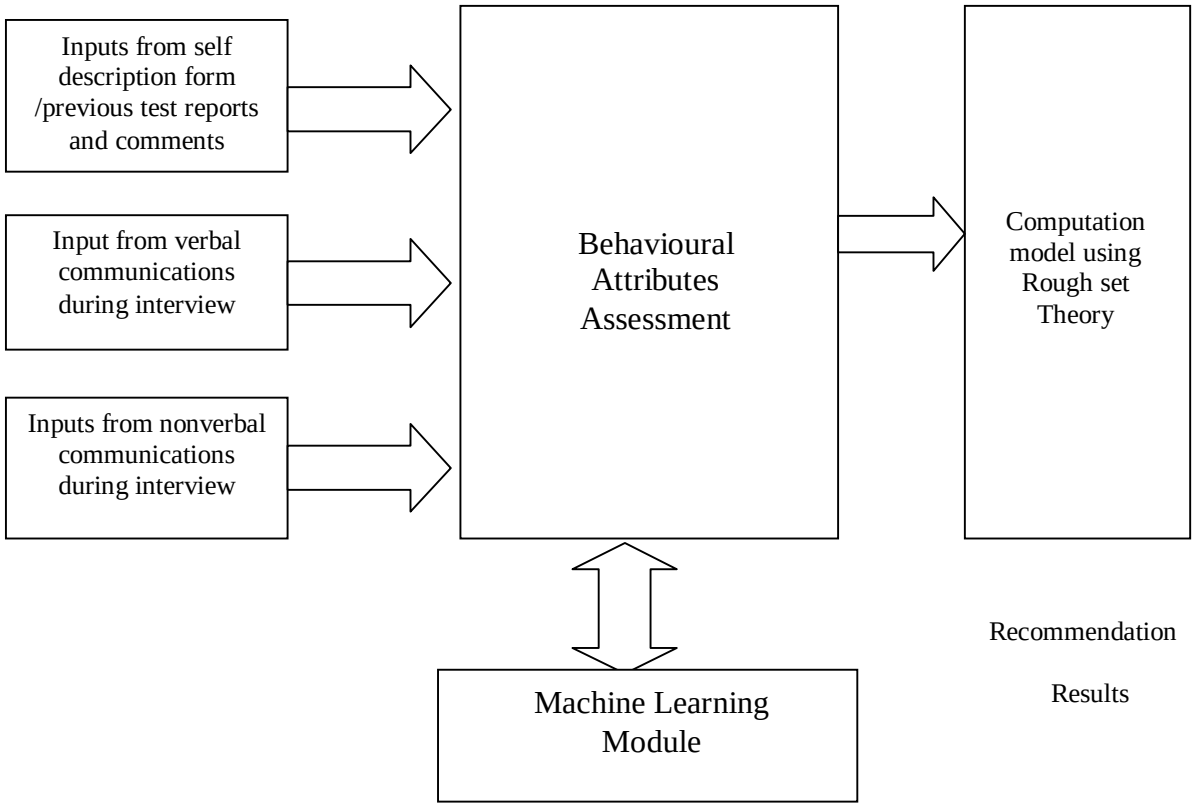


Fig. 1. Conceptual Architectural overview of the Interview Assessment System

IV. PROPOSED METHODOLOGY AND IMPLEMENTATION ASPECTS

A. Physical Setup for Personal Interview

There will be an Interviewer who will directly interact with the candidate and an observer who is a psychologist who will be responsible to code the behavioural attributes of the candidate using the computer assisted tool. A webcam shall record the interview in video form. This simple setup is shown in Fig. 2.

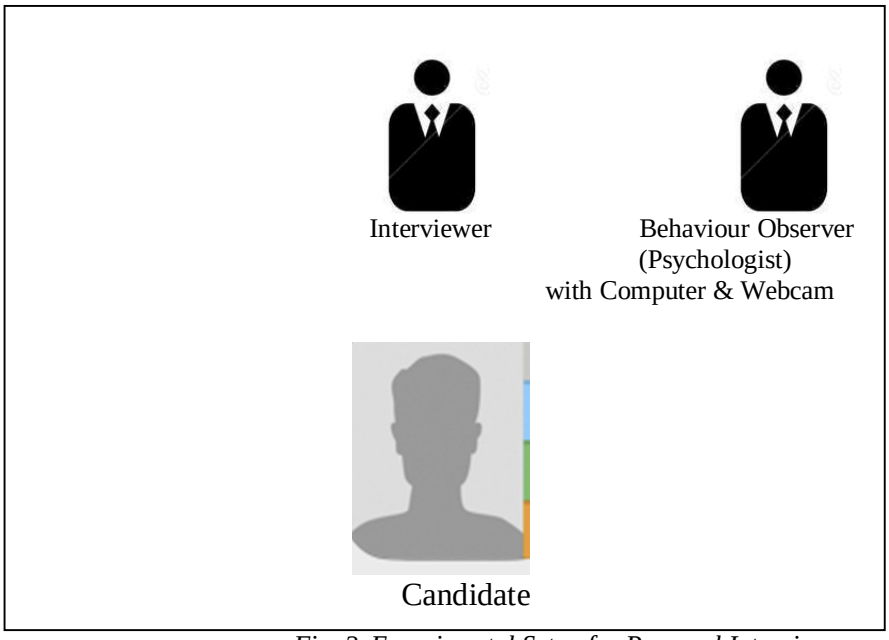


Fig. 2. Experimental Setup for Personal Interview

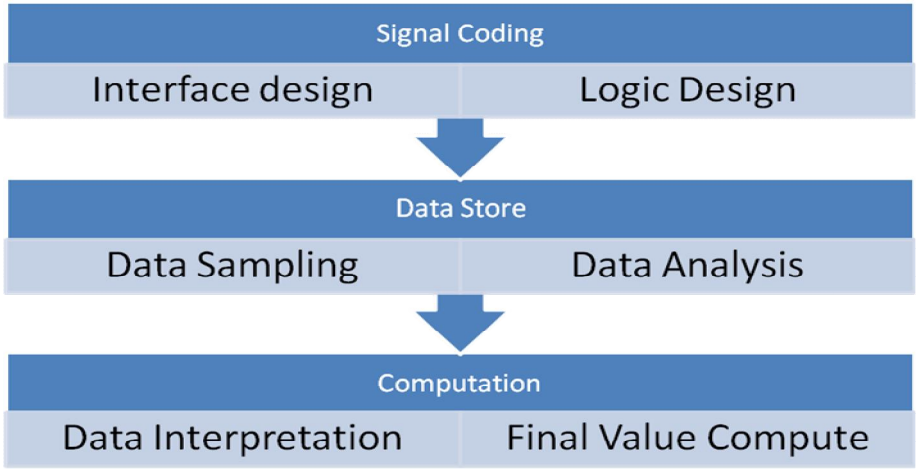


Fig. 3. Work Flow diagram for the Interview Coding System

B. Ground State Setting

As discussed earlier, the objective of Personal Interview is to verify and cross check the report card for earlier tests through personal interaction and incorporate any deviations therein with new findings. Evaluation reports for all these tests are with interviewer and thus, he already has an estimate of behavioural variable for the candidate. Based on this fact, ground state is set with the behavioural variable estimate on 0-10 point scale from previous report cards. A D.C. (flat) signal of that value is enabled for the maximum estimated duration (say 45 minutes) of interview. For example, if the estimated value for behavioural variable is 6 then a D C signal of 6v will be enabled for entire duration, the interview shall run.

C. Behavioural Variable

Behavioural Variable is a complex variable, which would determine the suitability of candidate for the post. It is determined by the abstract attributes like truthfulness, calmness, leadership, jolly, social outlook etc. that are summarized in the table 2. Its ground value is set by psychological test/ Group Task/Personal task. The ground value is moderated by behavioural inputs obtained during personal interview through various verbal / nonverbal communications.

Some such exposed attributes may be candidate's outlook, confidence, responsiveness, posture, gestures, body language, calmness or anxiousness, honesty and integrity or inconsistencies exposed during discussions etc. to name few important ones. The framework is flexible enough to incorporate customized parameters for behavioural variable.

D. The disturbance Model for recording observations

The recording of observations from candidate on this time synchronized base value signal is based on 'disturbance model'. In this approach, the interviewer is enabled to change the current ground value of the signal with the press of + or – keys on keyboard. Besides, to record various observations obtained from candidate, various shortcut keys are assigned as user events that may cause local or global changes on the ground signal. The waveform thus obtained is sampled at an appropriate frequency that could incorporate all the changes recorded on the signal.

A database keeps record of the obtained data from the sampling of waveform. The data values are filtered and the rough set theory[5] is applied to compute the final value of personality variable. Behavioural attributes are also made available to a machine learning module so that past rules are taken into consideration in the decision making process. Fig. 3 shows the work Flow diagram for the Interview Coding System.

E. Interface for recording non verbal communications during interview

An intuitive and efficient user interface is the decisive factor in usefulness of this evaluator. How easily and effectively the interviewer can record the observed attribute of the candidate depends upon that how icons for each are organized in groups so as to easily locate without effort in a user friendly way. Similarly, equivalent key shortcuts for each should be chosen so as to easily memorize. The signal can be coded in one of the following three ways:

- There are certain chronological events that are known beforehand; e.g. Entering of candidate into room, greetings, choosing and sitting on chair, Conversation, Leaving the room etc. There is a group of Separate pictorial Icon (and key shortcuts also) for these events on the screen. One of these icons when clicked opens a submenu wherefrom star rating can be selected from one to five stars for the performance of candidate in that particular event. These events are shown in Figure 5 Section A.
- Second group of icons(and key shortcuts also) belong to random events that address some well known body language exposures, body gestures and activities of candidate as observed by the interviewer. For example, fingers crossing or legs crossing by a candidate. Each exposure has some positive or negative impact on the base value. Such events may be marked on the signal waveform by marking a unique symbol like cross or dot of some specific color. to code the candidate behaviour on the signal for some unregistered attribute, + or – keys can be used. Each key press increases or decreases the corresponding Y- value by 1 point. This group of events can also be customized by deleting existing or adding new entries. These events are shown in Figure 5 Section B.
- Third group of icons belong to record the abstract behavioural attributes of the candidate. These attributes are the determining factors for what has been termed as "Officer Like Qualities (OLQ)". It is worth noting that many attributes come in pairs since they can be understood as two extremes of the same attribute. As previously, these attributes may be customized as per the requirements of the organization and post. Besides, weights of various behavioural attributes can be graphically adjusted to suit the exact requirement. These events are shown in Figure 5 Section C.

It is obvious that the first two categories of icons are used by the observer to code the non verbal communications synchronized with the time duration of the interview. The third category of icons shall be used by the personal interviewer just after the candidate has finished his interview. Various categories of events that may occur during the interview process are depicted in Fig. 4.

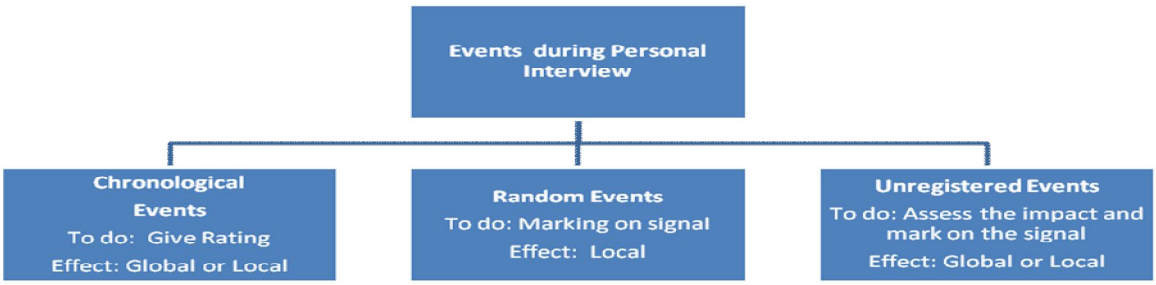


Fig. 4. Marking of various types of events during Personal Interview

V. RESULTS AND DISCUSSIONS

The proposed system has many obvious advantages:

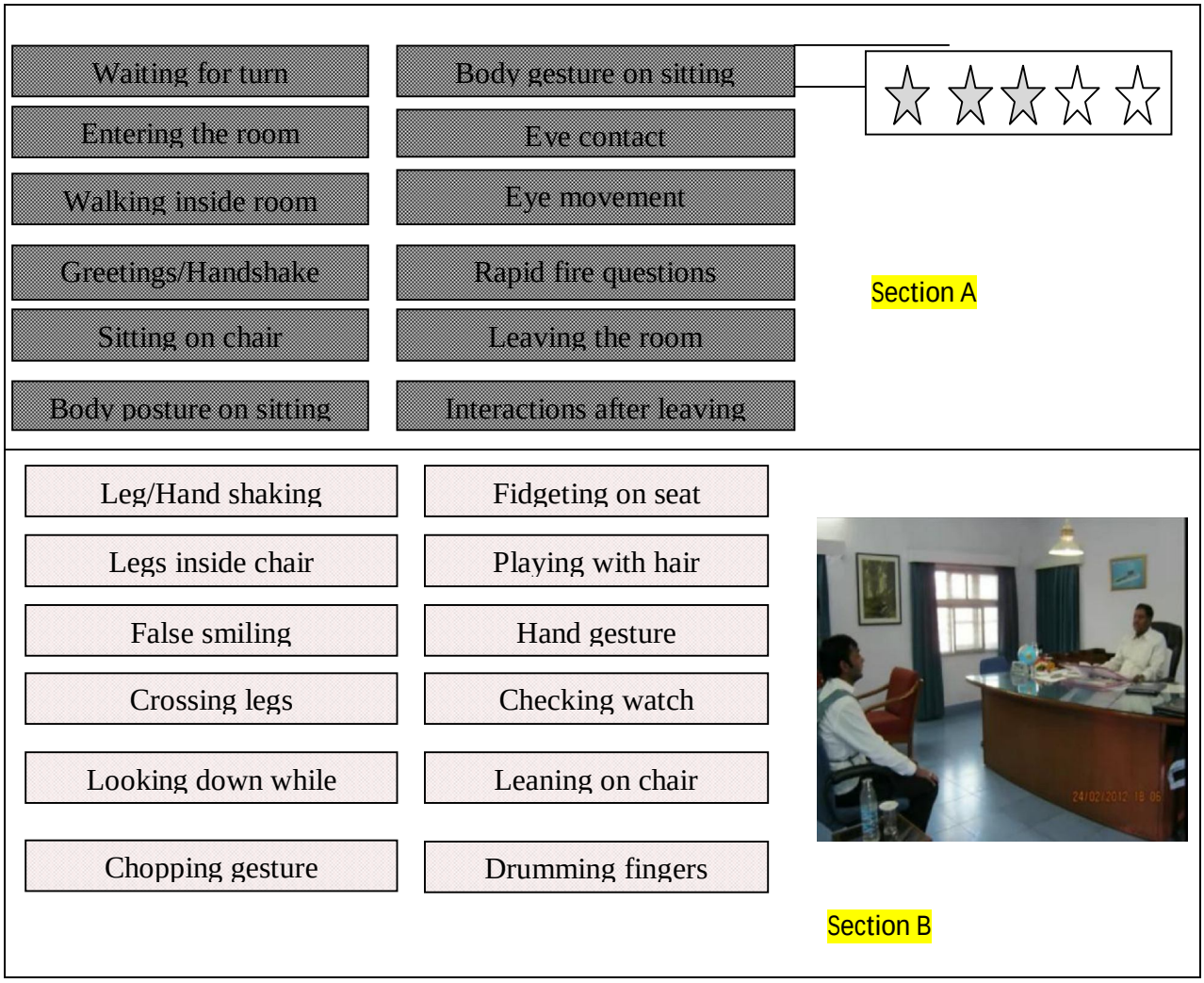
- A chronological event tracing is obtained in the form of a waveform which is verifiable as the coded behaviour waveform feature can be cross examined with the recorded video of the interview at any time.
- It saves time because with the help of tool all points will be recorded and computed simultaneously during the interview session.
- The proposed framework is flexible enough to adapt as per need. Personality attributes may be customized as per requirements.
- The interviewer can easily notice and record the entire positive and negative points of the candidate.

It is expected that the proposed system shall offer more objective assessment of candidate for the selection process.

VI. CONCLUSION AND FUTURE WORK

This paper presents a part of our ongoing project at a glance. Particularly, we have described the complete conceptual architecture and discussed the personal interview part of the project. The other parts i.e. computation of behavioural attributes, assessment of behavioural variable value using rough set theory and machine intelligence module together makes it a major project to be carried out in phases.

Usefulness of a System like the one proposed in this paper largely depends on how effective and user convenient interface is provided to code the behavioural attributes of the candidate being interviewed. It is expected that such a system shall assist the selection officials in objective assessment of the qualities they are looking for in the aspiring candidates.



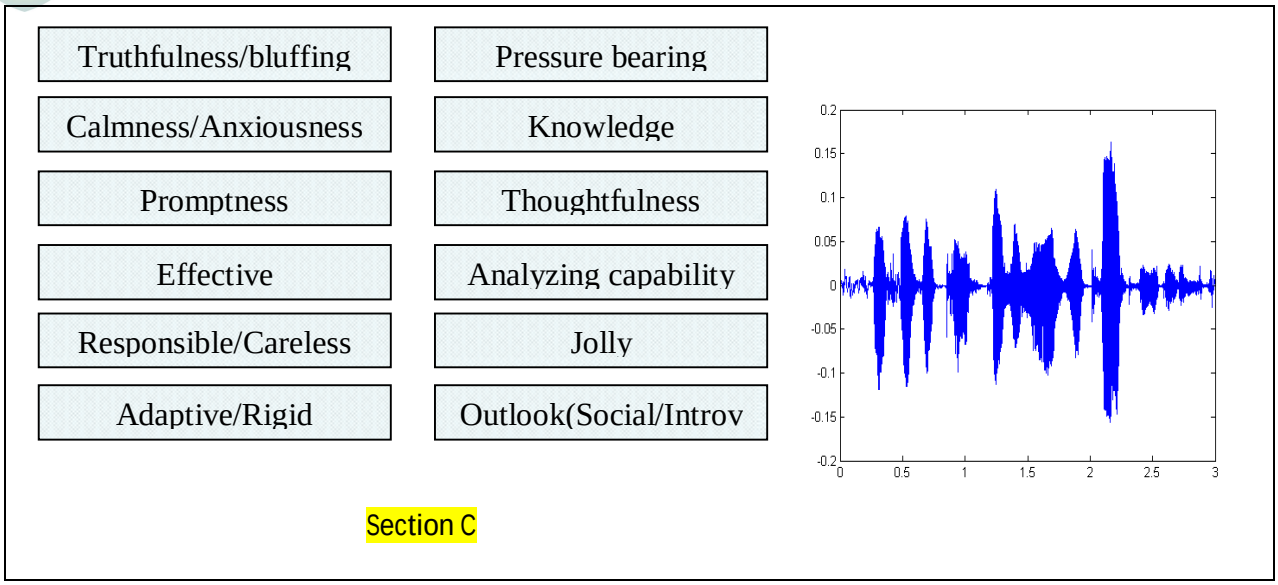


Fig. 5. User Interface Layout for the Interview Coding System

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