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Master of Information Technology

Comparing Disengaged Behavior within a Cognitive Tutor in the USA and Philippines

Ma. Mercedes T. Rodrigo, Ryan S.J.d. Baker, Jenilyn Agapito, Julieta Nabos, Ma. Concepcion
Repalam, and Salvador S. Reyes Jr.

Department of Information Systems and Computer Science,
Ateneo de Manila University, Quezon City, Philippines
mrodrigo@ateneo.edu, {jen_agapito@yahoo.com,
julietnabos@yahoo.com,
Conrepalam@gmail.com,
jayr02@gmail.com
Department of Social Science and Policy Studies, Worcester Polytechnic Institute,
Worcester MA, USA rsbaker@wpi.edu

Abstract. We study how student behaviors associated with engagement differ across different school settings. We present a study to investigate the variation in gaming the system and off-task behavior in schools in the USA and Philippines, using quantitative field observations on students using the same Cognitive Tutor lesson on scatterplots. We find that students in the Philippines go off-task significantly less but game the system significantly more than our sample of students in the USA. This study suggests that ITS designed for different settings or used in different settings will need to emphasize adaptation to different disengaged behaviors.

Keywords: gaming the system, off-task behavior, school context.

Introduction

In recent years, intelligent tutoring systems have left the research laboratory, expanded beyond the research classroom, and have started to see large-scale use worldwide [3, 5], creating the potential to use intelligent tutors to study cross-cultural differences in learners [cf. 5]. Beyond enabling scientific discoveries in this domain, greater attention to cross-cultural and cross-setting student differences in intelligent tutors has the potential to enable culturally-sensitive intelligent tutors that are educationally effective for a broader community of learners.

In this paper, we study how student behaviors associated with engagement differ across different school settings, comparing the frequency of gaming the system and off-task behavior in the USA and Philippines. Off-task behavior is much less common in East Asia than in the USA [1, 7], including in classrooms using educational software [7]. However, it remains unclear why students go off-task to such different degrees in East Asian and Western classrooms. Thus far, the primary hypothesis for this difference is that cultural factors explain the difference in incidence of off-task behavior [1]. However, it is also known that curricula are very different between East Asia and Western countries. We control for this possibility by using the exact same intelligent tutor and study design in both East Asian and American classrooms.

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Master of Information Technology

Computational Identification of DNA Motif using Gibbs Sampling Algorithm with Simulated Annealing

Julieta Q. Nabos

Marinduque State College

Tanza, Boac, 4900, Marinduque

julietnabos@yahoo.com

ABSTRACT

Identification of common patterns or motif in biological sequences helps biologists and geneticists in understanding the genes regulatory networks. However, experimental identification of these common patterns costs a lot of resources. Thus, it became a challenge to computer scientists to develop algorithms for computational identification of motif. Automatic identification of motif from DNA sequences is widely recognized to be difficult. Different approaches and searching optimizations have been developed. One of these approaches is the use of Gibbs sampling methods, a potent probabilistic approach in common pattern discovery, but prone to local optima problem. Simulated annealing, on the other hand, is a known optimization technique. This study explored the efficiency of Gibbs sampling algorithm combined with Simulated Annealing. The algorithm was implemented in Java and experimentation on different combinations of simulated annealing parameters was done on synthetic DNA sequences where motif was planted.

Keywords: Motif finding, Gibbs Sampling, Simulated Annealing

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Master of Information Technology

Finding Planted DNA Motifs using Gibbs Sampling with Simulated Annealing and Neighborhood Search

Julieta Q. Nabos
Ateneo de Manila University
Katipunan Road, Loyola Heights
Quezon City, Philippines
julietnabos@yahoo.com

Proceso L. Fernandez, Jr., Ph.D.
Ateneo de Manila University
Katipunan Road, Loyola Heights
Quezon City, Philippines
pfernandez@ateneo.edu

1. ABSTRACT

Identification of common patterns or motifs in biological sequences helps biologists and geneticists in understanding the genes regulatory networks. However, automatic identification of motif from DNA sequences is widely recognized to be difficult. This study explores a motif finding heuristic that combines Gibbs sampling and simulated annealing. It is shown that by adding a simple technique called neighborhood search, the heuristic is able to significantly improve its chances of finding the optimal planted DNA motifs.

Keywords: motif finding, Gibbs Sampling, Simulated Annealing

2. 1. INTRODUCTION

Biological motifs are short, frequently occurring patterns that are presumed to have some important biological functions. Identification of motifs in biological sequences helps biologists and geneticists in understanding the genes regulatory networks. However, experimental identification of these common patterns is costly and requires a lot of resources. The problem is not a simple string search because of the occurrences of mutations, insertions and deletions that are possible in biological sequences. Thus, it has become a challenge for computer scientists to develop efficient algorithms for computational identification of motifs.

In this study, we focus on DNA sequences and consider an efficient heuristic for approximating solutions to the DNA Motif Finding Problem. It is shown that the use of the Gibbs Sampling method with Simulated Annealing and Neighborhood Search is able to find good approximate solutions to the given problem.

The remainder of the paper is organized as follows. Section 2 formally introduces the DNA Motif Finding problem and also briefly explains the Gibbs Sampling and Simulated Annealing methods. This is followed by a discussion of the related literature in the next section. Section 4 describes the overall methodology followed in this study. The results and analysis are presented in Section 5, while Section 6 provides a summary of the main findings of the research and some suggestions for possible extension

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Doctor in Educational Management

The Relationships between Sequences of Affective States and Learner Achievement

Ma. Mercedes T. RODRIGO, Ryan S.J.d. BAKER and Julieta Q. NABOS^a *Department of Information Systems and Computer Science*

Ateneo de Manila University

Loyola Heights, Quezon City, Philippines Department of Social Science and Policy Studies

Worcester Polytechnic Institute

Worcester MA, USA

mrodrigo@ateneo.edu, julietnabos@yahoo.com, rsbaker@wpi.edu

Abstract. We study the relationships between affective states and sequences and learner achievement using sequential pattern mining techniques. We found, in accordance with prior research, that boredom is an undesirable state that is both persistent and detrimental to learning. We also found that confusion punctuated with periods of engaged concentration contributes to learning. However, confusion alone has a negative impact on student achievement, possibly indicating that students are stuck. These results shed light on past results finding inconsistent relationships between confusion and learning.

Keywords: boredom, confusion, engaged concentration, student affect, affect sequences, student achievement, Scatter plot tutor

Introduction

Past studies that examine relationships between affective states and achievement typically consider these states in isolation [cf. 4, 8]. However, learners experience affective states seamlessly and successively, implying that studies of affect in learning can be enriched by including time in the analysis. Affective dynamics are the study of natural shifts in learners' affective states over time [7]. Studies regarding affective dynamics determine which affective states tend to persist and which transitions, given a start state, are most likely or unlikely to occur. The combination of these analyses has led to the discovery of "virtuous cycles" where learning-positive behaviours (such as engaged concentration [3]) persist and "vicious cycles", where learners remain in learning-negative behaviours such as frustration [9] and boredom [3]. As of the time of this writing, though, published studies have not yet shown relationships between affective dynamics and student achievement. Our goal is to determine which combinations of states are associated with poorer and better learning.



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Master in Information Technology

TraceTech: A Graduate Tracer Study of BS Information Technology and BS Information Systems from 2012 to 2018

Ronjie Mar L. Malinao
Marinduque State College,
Tanza, Boac, Marinduque
ronjieclear@gmail.com

Maria Nessa M. Solomon
Marinduque State College,
Tanza, Boac, Marinduque
mnessa.solomon@gmail.com

Art Jervin L. Magcamit
Marinduque State College,
Tanza, Boac, Marinduque art28.magcamit@gmail.com

Julieta Q. Nabos Marinduque State College,
Tanza, Boac, Marinduque
jqnabos.msc@gmail.com

ABSTRACT

This study aimed to determine the employability rate of the graduates of BSI/T and BSIS programs of Marinduque State College. Findings from this study provide an invaluable information on graduates' current career paths that can be used to calibrate the relevance of their programs' curriculum to their current jobs. Online survey forms were used as the primary source of data through social media which is found to be more effective than the traditional manner of sending and retrieving survey questionnaire. A total of three hundred ninetyone (391) graduates responded to the survey providing a participation rate of 37%. The respondent profile is broadly representative from class of 2012-2013 to class of 2017-2018. The study concluded that 45% of the graduates of BSI/T and 37% of the BSIS are employed and most of the employment is in consonance to their skills acquired during college and still relevant to their degree.

KEYWORDS

Tracer Study, BS Information Technology, BS Information Systems, Marinduque State College

1 INTRODUCTION

Graduate Tracer Study has proven [1] to be an effective method in retrieving accurate inputs for ensuring the human capital produced by higher education institutions are always relevant and be able to meet the ever-changing demand of job market.

The Commission on Higher Education (CHED) Office of Policy Planning, Research, and Information (OPPRI) conducted the Graduate Tracer Study (GTS) since SY 2008-2009. Data collected were analyzed and used to calibrate the educational system of State Colleges and Universities. Consequently, the commission issued several memorandums to appraise graduate data [2] to determine if its graduate attained the intended program outcomes and utilized those data to measure and enhance the performance [3] of the SUCs.

Since 2008, the Bachelor of Science in Information Technology and Bachelor of Science in Information Systems Program of the School of Technology have produced professionals in different fields of Information Technology. It became vital to know what happened to the graduates in order to determine the capability of the program and identify lapses. Thus, a study [4] was conducted to address the needs. The result gives an insight into the current situation of the industry, from the new tools and programming languages, up to the latest project development methodologies [4]. The study helped the programs in achieving Level I accreditation of Accrediting Agency of Chartered Colleges and Universities in the Philippines (AACUP). However, there was no further study conducted to continue the monitoring of the performance and employability of the graduates. Thus, this study aims to continue the study of [4], utilizing a new questionnaire prescribed by CHED. This study aimed to determine the employability of the graduates of BSI/T and BSIS.

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Master in Information Technology

POTENTIAL OF RANDOM PROJECTION TO ENHANCE APPROXIMATE ALGORITHM FOR DNA MOTIF SEARCH

Julieta Q. Nabos

School of Engineering
Marinduque State College
julietnabos@yahoo.com

Abstract

With the accumulation of genomic data, motif finding in biological sequences became an important post genomic analysis task. Molecular biologists have been collaborating with computer scientists to develop algorithms for finding DNA motifs. Motif finding in DNA sequences is difficult because mutations may occur which causes mismatches in DNA motif. This study attempted to improve an approximate algorithm for DNA motif finding by combining Random Projection (RP) strategy and GS-SANS, a Gibbs Sampling based algorithm that uses simulated annealing and neighborhood search techniques. Results have shown that accuracy of GS-SANS with Random Projection (GS-SANS Pro) is significantly better than other algorithms that also used RP strategy in finding planted (l,d) - motif. Furthermore, a new scoring technique introduced in this paper improved more GSSANS Pro.

Keywords: motif finding, Gibbs Sampling, Simulated Annealing, Neighborhood Search, Random projection

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The Effects of an Interactive Software Agent on Student Affective Dynamics while Using an Intelligent Tutoring System

Ma. Mercedes T. Rodrigo, Ryan S.J.d. Baker, Jenilyn Agapito, Julieta Nabos, Ma. Concepcion Repalam, Salvador S. Reyes, Jr., (Student Member, IEEE), Maria Ofelia C.Z. San Pedro

Abstract— We study the affective states exhibited by students using an intelligent tutoring system for Scatterplots with and without an interactive software agent, Scooter the Tutor. Scooter the Tutor had been previously shown to lead to improved learning outcomes as compared to the same tutoring system without Scooter. We found that affective states and transitions between affective states were very similar among students in both conditions. With the exception of the “neutral state”, no affective state occurred significantly more in one condition over the other. Boredom, confusion, and engaged concentration persisted in both conditions, representing both “virtuous cycles” and “vicious cycles” that did not appear to differ by condition. These findings imply that – although Scooter is well-liked by students, and improves student learning outcomes relative to the original tutor – Scooter does not have a large effect on students’ affective states or their dynamics.

Index Terms— affective dynamics, gaining the system, intelligent tutoring system, Embodied Conversational Agent, Pedagogical Agent

1 INTRODUCTION

Increasingly, student interaction with educational software is mediated through interactive software agents of various types. One key form of interactive software agent is the embodied conversational agent (ECA). Embodied conversational agents are the software implementation of the human face-to-face communication metaphor. They are animated anthropomorphisms capable of mixed initiative, verbal and nonverbal communication, and rules for transfer of control [1]. There have also been many recent interactive software agents (also called “pedagogical agents”) in the domain of education, which possess all of the attributes of ECAs, except that they do not accept natural language input from students [2], [3], [4], [5], [6], [7], [8], [9]. Indeed, human-to-agent communication occurs through menus, or actions in an environment. However, while ECAs and other interactive software agents may be inspired by human-human interaction, and human beings respond socially to computers in many fashions [e.g., 10], humans do not always respond in the same way to a computer as to a human, and it is not fully understood how humans respond to behavior by agents. One key difference between human reactions to agents and human reactions to other humans is that humans tend to react more strongly to assertive and aggressive behavior on the part of other humans than comput-

ers, responding less negatively to computers when they behave in this fashion [11]. An extreme example of this is found in evidence that many students respond with delight to being verbally insulted by an ECA embedded in an intelligent tutoring system (personal communications, Sidney D’Mello), a very different response occurs when teachers insult students [12]. As such, it is important to study how humans respond to the behavior of agents, particularly when an agent requests certain behavior on the part of a user or student.

When applied to educational software such as intelligent tutoring systems, agents frequently track student cognition, behavior, or affect in order to provide students with specific support based on individual differences along these dimensions [2], [3], [4], [15]. As such, agent behavior and responses can be considered a type of formative feedback to students [15], and agents often implement a variety of formative feedback strategies. Some of the behaviors which agents manifest in response to student individual differences include the use of emotional expressions [3], [4], non-verbal gestures and communication [5], [16], pedagogical messages [17], requests to stop undesired behavior [3], offering alternate learning experiences [3], and attributional, meta-cognitive, or motivational messages [3], [4]. Interactive software agents have been shown in several studies to positively influence student learning, attitudes, and engagement [2], [3], [4], [5], [6], [7], [16], [17]. However, it is not entirely clear how agents impact students’ cognition, behavior, and affect to produce these benefits.

Within this paper, we focus our analyses on the impact of an agent on students’ affect, in particular on agent which

* M.M.T. Rodrigo, J. Agapito, J. Nabos, M.C. Repalam, S. S. Reyes, Jr. and M.O.C.Z. San Pedro are with Department of Information Systems and Computer Science of the Ateneo de Manila University, Philippines. E-mail: mercedr@ateneo.edu.

* R.S.J.d. Baker is at Worcester Polytechnic Institute, Worcester, MA. E-mail: rmbaker@wpi.edu.