

of page load time for a particular question accessed by the test-taker. The watermarked questions are fed to a seed engine 108 that propagates watermarked questions 108 onto a plurality of seed site domains 110 (honeypots) corresponding to the questions. This creates a cluster of seed sites that are monitored during an exam. Each seed site domain contains a listener engine 112 that tracks listener events (to determine visit duration, mouse hover x/y coordinates, mouse click events and x/y coordinates, screen resolution, window resolution) in addition to any available PHP server header information when the seed site domain is loaded.

Referring to FIG. 2 is a high-level schematic diagram 200 of an aspect of the disclosure. A client/user/instructor 201 uploads a pool of questions 203 to be used for distance learning assessment on to the system server 202. The system server 203 processes the questions 203 via the watermarking engine 204. The unique strings are then given preference in search engines that are indexed/crawled. The watermarking engine 204 is operable to replace standard characters with visually-similar entities using Unicode character sets or UTF-8 encoding. This becomes embedded within the question content. The watermarking engine 404 transforms the original question(s) into a unique string(s) that previously never existed on any indexed location, be it on the Web or otherwise, while maintaining the visual appearance of the original question(s).

FIG. 3 is a detailed schematic of the watermarking process in accordance with an aspect of the disclosure. A pair of original questions 303 are converted into watermarked questions in Hyper Text Markup Language (HTML) at 305 by the watermarking engine. The watermarked questions retain their original appearance at 307. Note, the letters of the watermarked questions are preferably visually identical to the originals, but similar appearing letters are also acceptable substitutes.

FIG. 4 is a schematic of a sequential process for administering an assessment 400 using watermarked questions. The questions are presented on a network access device generally characterized by the reference numeral 409. The network access device is configured to communicate with a communications network shown generally at 411, and can be any type of general-purpose computer, tablet, smartphone, personal digital assistant, and the like.

FIG. 5 is a schematic diagram showing details of an initial sign-on process 500 within a learning management system (LMS) in accordance with an aspect of the disclosure. A student (assessment taker) 513 is presented with a sign-in/on portal on a network access device 509, which prompts for entry of the student's name and identification (ID), email, etc. The student completes and submits this information 517 prior to starting the assessment. This prevents assigning the user's identifier information to their PHP server header information. The user's identifying information is captured and assigned to their corresponding PHP server headers. The information is thereafter matched up with the assessment taker's PHP server headers.

FIG. 6 illustrates a more detailed view of a watermarking process 600 in accordance with the disclosure. Watermarked questions 606.sub.w1, 606.sub.w2, . . . 606.sub.wn are used for two purposes that occur simultaneously. First, the server 102 (FIG. 1) processes a pool of watermarked questions using the seed engine 108. The purpose of seed engine 108 is to propagate the watermarked questions onto various seed site domains 110. This creates a cluster of seed sites that can be monitored during an exam. Each seed site domain 110 contains a listener engine 112 that tracks listener events (to determine visit duration, mouse hover x/y coordinates, mouse click events and x/y coordinates, screen resolution, window resolution), in addition to any available PHP server header information when the seed site domain is loaded. Second, the watermarked questions are submitted to an LMS as a replacement for the original questions to be used for an assessment.

FIG. 7 is a screenshot of an illustrative graphical user interface via a web page utilized in a demonstration of the disclosure. Upon registering to take an assessment, a student is provided with an Exam Password as shown. If at any point during the assessment the student uses a search engine such as, for example, GOOGLE, to search for illicit online materials/test banks/answers, they are in violation of the terms of the assessment. When a user queries the search engine with watermarked terms, the search results present corresponding seed site domains 110, as described above.

FIG. 8 is a screenshot of an exemplary web page 800 that presents seed sites after a search undertaken by a student using the watermarked questions.

With reference now to FIG. 9, when a test-taker visits a seed site link, the following operations will occur.

Upon reading this disclosure, those of skill in the art will appreciate still additional alternative structural and functional designs for a system and a process for detecting cheating during online assessments through the disclosed principles herein. Thus, while particular embodiments and applications have been illustrated and described, it is to be understood that the disclosed embodiments are not limited to the precise construction and components disclosed herein. Various modifications, changes and variations, which will be apparent to those skilled in the art, may be made in the arrangement, operation and details of the method and apparatus disclosed herein without departing from the spirit and scope defined in the appended claims.

* * * * *

