

Auto Multiple Choice - Feature # 190: connect by dots question type

Status:	New	Priority:	Normal
Author:	Pieter Van den Hombergh	Category:	LaTeX
Created:	06/19/2013	Assignee:	
Updated:	10/16/2013	Due date:	
Description:	<p>One type of question is quite popular at my site and is used in an electronic exam settings.</p> <p>The electronic exam sessions in which this exam is performed has al kind of issues. A paper exam (AMC) would be better.</p> <p>The type of question is: you have n items and e.g. m descriptions and you have to match up the descriptions with the items.</p> <p>In a electronic version you could move either item or description, however semantically a rectangular matrix of n x m columns is equivalent. In fact such question can be considered a n or m separate multiple choice questions, which ever of n or m is smaller.</p> <p>Typically n=12 items and m =10, so you receive little hint by trying to find the missing connections.</p> <p>The advantage of having this question type is that you can save a lot of paper because you do not have to repeat either n questions or m answers.</p> <p>For it to work in AMC style, both the n items and the m descriptions should be randomized.</p> <p>Maybe it is already doable with the current concepts in AMC, then I would like to receive a pointer and I will prepare a question-set based on European geography (cities) and descriptions as an example to be shared as such in the AMC community.</p> <p>By the way, 58 percent of the colleagues in teacher team also started using AMC, so it is getting quite popular.</p>		

History

06/19/2013 02:32 pm - Alexis Bienvenüe

Could you draw a sample question, to illustrate where you think the things should go (boxes, items, descriptions...)?

How about the scoring strategy? Can we score each item separately, or do you need for example a particular score when the student chose the same item for two different descriptions?

06/19/2013 02:55 pm - Pieter Van den Hombergh

Questions and items are such that only one match (filled box in the n x m matrix) is correct, from the standpoint of the examiner of course.

although I have one such question in my exams, I still used it as open question and used lines to connect item an descriptions. In that case it is about (design) patterns and description.

A neutral question would be

cities 7: Paris, London, Berlin, Amsterdam, Brussels, Rome, Madrid. To be randomised and as column headers (Just the digit or letter)

descriptions 7: Houses 14 professional socker teams (London), Liberated by Russians (Berlin), Capital of free soft drugs (Amsterdam), Houses many European institutions (Brussels), City of light (Paris).

To be randomised used as row header (Just letter or digit, the reverse of column)

1 2 3 4 5 6 7

A ☐ ☐ ☐ ☐ ☐ ☐ ☐

B ☐ ☐ ☐ ☐ ☐ ☐ ☐

C ☐ ☐ ☐ ☐ ☐ ☐ ☐

D □ □ □ □ □ □

E □ □ □ □ □ □

In the end I would still want to use a separate answer sheet to stick to one paper to scan per student.

06/19/2013 03:00 pm - Pieter Van den Hombergh

It is even thinkable that the students get the items, matrix and descriptions on separate sheets, so that they can put item and descriptions on either side of that matrix and have the
(almost) same comfort as in the electronic exam.

You could cram that maybe into one page, when you allow rotating either items of descriptions. A few of such sets (say 10 items per set, 12 descriptions) would allow you to put 30 mc alternatives on three pages.

10/16/2013 02:06 pm - Pieter Van den Hombergh

Alexis Bienvenüe wrote:

> Could you draw a sample question, to illustrate where you think the things should go (boxes, items, descriptions...)?

> How about the scoring strategy? Can we score each item separately, or do you need for example a particular score when the student chose the same item for two different descriptions?

My conceptual model is that the question are scored in a *group* (as in all belonging to the same element) and each row of the above would be a question.

This question type is actually a compact form of a set of questions with the same set of answers (choices).

My approach currently is to create a group as in \nouveau groupe per such question. All the questions would be in this group and printed on paper together (in one block), with the order of the questions shuffled, but the choices not shuffled, because they are shuffled once, to create the top row of the matrix.

10/16/2013 02:08 pm - Pieter Van den Hombergh

Questions and items are such that only one match (filled box in the $n \times m$ matrix) is correct, from the standpoint of the examiner of course.

although I have one such question in my exams, I still used it as open question and used lines to connect item an descriptions. In that case it is about (design) patterns and description.

A neutral question would be

cities 7: Paris, London, Berlin, Amsterdam, Brussels, Rome, Madrid. To be randomised and as column headers (Just the digit or letter)

descriptions 7: Houses 14 professional soccer teams (London), Liberated by Russians (Berlin), Capital of free soft drugs (Amsterdam), Houses many European institutions (Brussels), City of light (Paris).

To be randomised used as row header (Just letter or digit, the reverse of column)

<pre>

a1 a2 a3 a4 a5 a6 a7

qA □ □ □ □ □ □

qB □ □ □ □ □ □

```
qC □ □ □ □ □ □
qD □ □ □ □ □ □
qE □ □ □ □ □ □
```

</pre>

In the end I would still want to use a separate answer sheet to stick to one paper to scan per student.

10/16/2013 02:51 pm - Pieter Van den Hombergh

I have some ideas but stuck with the integration into AMC.

Lets call the new question type questionmatrix, which is a new environment, much the same as the other question types

Per questionmatrix I would create a *nouveau groupe*. The questions should be presented in rows, the answers (choices) as column headers. Inside the question group we have the environment _qamatrix_ which contains qapair commands or dummy pairs. qapair takes a question and the correct answer. dummypair has onlo a (wrong or not fitting) answer)

An the end the environment I know the total of pairs, and process as follows:

shuffle the pairs (or shuffle questions and answers the same way). When distributing the questions to the matrix, the correct answers would still be on the diagonal, but the order of answers (and questions) mixed up.

For each qapair (not the dummy pair) create a question-row with the question at the start of the row and empty choices (they will be in the table header). The correctchoice will have column number equals to the question number in the shuffled set.

Put these questions-rows in the nouveau groupe and shuffle that.

From this group print (dump) the questions.

<pre>

Using the AMC macros, I would shuffle pairs like this, that is a I have two equally long groups and exchange the same elements in both groups.

```
\newcommand\AMC@shufflepairs[3]{ %
  \AMC@sti=#1\relax%
  \@whilenum\AMC@sti>\@ne\do{ %
    \AMC@SRmax{\AMC@sti}\advance\AMC@SRnum\@ne\relax%
    \AMCsw@p{\csname #2\romannumeral\AMC@SRnum\endcsname}%
      {\csname #2\romannumeral\AMC@sti\endcsname}%
    \AMCsw@p{\csname #3\romannumeral\AMC@SRnum\endcsname}%
      {\csname #3\romannumeral\AMC@sti\endcsname}%
    \advance\AMC@sti\m@ne\relax%
  }}
\end{code}
```

A question in latex format would look like this:

<pre>

```
\begin{questionmatrix}{qamatrix-oCapitals1}
  \EN{Below your find a matrix with check boxes, cities, one per row and
    countries, one per column. The number of countries exceeds the number of
    cities in the matrix. Your problem is to match city and
    country by ticking the check box on the junction between
    city on the rows and countries on the columns.}
  % harmless example:
  \begin{qamatrix}
    \qapair{aLondon}{AGreat Britain}
    \qapair{bParis}{BFrance}
    \qapair{cMadrid}{CSpain}
    \dummypair{dNot used}{DIreland}
    \qapair{eBerlin}{EGermany}
    \qapair{fAmsterdam}{The Netherlands}
```

```

\dummypair{gNot used}{Holland}
\end{qamatrix}
\end{questionmatrix}
</pre>

```

10/16/2013 02:55 pm - Pieter Van den Hombergh

Is it possible to create a `_choices_` group on the fly and insert it into the exam?

What I am considering is something like this:

```

<pre>

% Create a matrix row which should be the same as a normal choices environment plus content.
% First param is question, 2nd is row number 3rd
% is row length counted in answers. The correct answer is put in
% position 'row',
% because pre-shuffling the correct answer lie on the diagonal.
\newcommand\AMC@matrix@row[3]{ %
\def\AMCbeginAnswer{\textbf{#1} :}
\def\AMCendAnswer{\%
}
\choicescustom{ %
\AMC@sti=0\relax%
\@whilenum\AMC@sti<#2\do{ %
& \wrongchoice{} %
\advance\AMC@sti\@ne\relax%
}%
& \correctchoice{} %
\advance\AMC@sti\@ne\relax%
\@whilenum\AMC@sti<#3\do{ %
& \wrongchoice{} %
\advance\AMC@sti\@ne\relax%
}}
}

```

10/16/2013 03:39 pm - Pieter Van den Hombergh

- *File multivarquestions.zip added*

I have created a small Java (java 7) demo project (netbeans project, runnable with ant) to show what I want to program.

At the moment it is still hard to program the algorithm in latex, since that is quite a different programming language.

Files

| | | | |
|-----------------------|---------|------------|-------------------------|
| multivarquestions.zip | 60.9 kB | 10/16/2013 | Pieter Van den Hombergh |
|-----------------------|---------|------------|-------------------------|