A Method for Multilingual Automatic Item Generation

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A SACRED PLACE IN TESTING
MORE CONTEXT

Requires **large item banks**

Test items have a short life and must be **retired frequently**

Test items must be developed in **multiple languages**
AUTOMATIC ITEM GENERATION

AIG

is the process of using item models to generate test items with the aid of computer technology.
George has a collection of 397 postage stamps. He got 61 of the stamps from Malaysia. Approximately what percentage of the stamps come from Malaysia?

A 7%
*B 15%
C 20%
D 23%
<NAME> has a collection of <TOTAL> postage stamps. He has <SUBSET> of the stamps from Malaysia. Approximately what percentage of the stamps come from Malaysia?
STEP #2: IDENTIFY CONTENT

<NAME>  George, Mike
<TOTAL>  11-201 (no multiples of 10)
<SUBSET>  5-75% of Total
George has a collection of 397 stamps. He got 61 stamps from Malaysia. Approximately what percentage of the stamps come from Malaysia?
A 7%
B 15%
C 20%
D 23%

Mike has a collection of 112 coins. He got 45 coins from Spain. Approximately what percentage of the coins come from Spain?
A 40%
B 36%
C 52%
D 84%

Mike has a collection of 139 coins. He got 70 coins in Canada. Approximately what percentage of the coins come from Canada?
A 50%
B 57%
C 87%
D 91%
GENERATIVE OUTCOMES

12 CTB item models in mathematics = 433,299 items

6 CTB item models in science = 4,093 items
CLONING (1-LAYER MODEL)

1-Layer Element

<NAME>: George, Mike

Element A

Value 1
Value 2
Value 3
Value 4
etc.

NAME

George
Mike
N-LAYER MODEL (NOT CLONING)

Value with [Element C] and Value with [Element D]
Value with [Element D]
[Element C] and [Element D]
[Element D]

Value 1
Value 2
Value 3
Value 4

Value 1
Value 2
Value 3
Value 4
N-Layer Elements:

(NAME> George, Mike

(TOTAL> 11-201 (no multiples of 10)

(SUBSET> 5-75% of Total

LAYER 1: Postage Stamp from <COUNTRY>; Coins from <COUNTRY>

LAYER 2: <COUNTRY> Malaysia, Brazil, Spain, Canada
<NAME> George, Mike

<TOTAL> 11-201 (no multiples of 10)

<SUBSET> 5-75% of Total

LAYER 1: Postage Stamp from <COUNTRY>; Coins from <COUNTRY>

LAYER 2: <COUNTRY> Malaysia, Brazil, Spain, Canada
<NOMBRE> George, Mike
<TOTAL> 11-201 (no múltiplos de 10)
<SUBCONJUNTO> 5-75% del total

CAPA 1: Franqueo de <PAÍS>; monedas de <PAÍS>

CAPA 2: <PAÍS> Malasia, Brasil, España, Canadá
George tiene una colección de 397 sellos. Él consiguió 61 de los sellos de Malasia. Aproximadamente qué porcentaje de los sellos vienen de Malasia?
A 7%
B 15%
C 20%
D 23%

Mike tiene una colección de 112 monedas. Obtuvo 45 de las monedas de España. Aproximadamente qué porcentaje de las monedas proceden de España?
A 40%
B 36%
C 52%
D 84%

Mike tiene una colección de 139 monedas. Obtuvo 70 de las monedas de Canadá. Aproximadamente qué porcentaje de las monedas vienen de Canadá?
A 50%
B 57%
C 87%
D 91%
乔治拥有397邮票的集合。他得到了来自马来西亚的邮票61。大约有多少百分比的邮票来自马来西亚的？
A 7%
B 15%
C 20%
D 23%

迈克的112金币的集合。他把硬币45来自西班牙。大约有多少百分比的硬币来自西班牙？
A 40%
B 36%
C 52%
D 84%

乔治92交易卡的集合。他得到的卡45从曲棍球。大约有多少比例的总来自曲棍球？
A 49%
B 84%
C 44%
D 52%
# GENERATIVE OUTCOMES

<table>
<thead>
<tr>
<th>Number of CTB Item Models</th>
<th>Mathematics</th>
<th>Science</th>
</tr>
</thead>
<tbody>
<tr>
<td>6 CTB item models</td>
<td>= 126,650 items in English</td>
<td>= 2,411 items in English</td>
</tr>
<tr>
<td></td>
<td>= 124,100 items in Spanish</td>
<td>= 2,286 items in Spanish</td>
</tr>
<tr>
<td></td>
<td>= 125,717 items in Chinese</td>
<td>= 2,311 items in Chinese</td>
</tr>
<tr>
<td>5 CTB item models</td>
<td>= 124,100 items in Spanish</td>
<td>= 2,286 items in Spanish</td>
</tr>
<tr>
<td></td>
<td>= 125,717 items in Chinese</td>
<td>= 2,311 items in Chinese</td>
</tr>
</tbody>
</table>
Automatic item generation is a new research area that strives to combine “art” (HUMANS: Judgment, Expertise, Experience) with “science” (MODERN COMPUTING) to create a new approach to item development.
CONCLUSION

Computer-Based Testing (15 years ago) → Automated Essay Scoring (10 years ago) → Automatic Item Generation (Now)
THANK YOU

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