

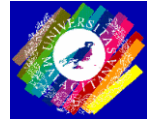
# SIETTE: Internet-based evaluation system



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  - TREE Project
  - Adaptive Testing
- ◆ SIETTE System
  - Description
  - Architecture
  - Modules
    - \* Test editor
    - \* Temporary student model
    - \* Test generator
    - \* Evaluation algorithm
- ◆ Example
- ◆ Conclusions

## SIETTE: Temporary student model

- ◆ A temporary student model is created and updated for each student that takes the test.
- ◆ The information contained in the temporary student model is used by the test generator to provide adaptive capabilities.
- ◆ Student's knowledge is a random variable  $\theta$  that can take 11 values (0,...,10).
- ◆ In absence of information, the probability is uniformly distributed between the 11 levels.
- ◆ Probabilities are updated with a bayesian procedure.



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## SIETTE: Test generator

Test generation algorithm consists of three procedures:

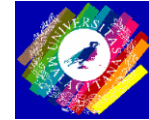
### 1. Question selection

Test developers can choose between:

- \* **bayesian** procedure (minimum posterior standard deviation),
- \* **adaptive** procedure (minimum distance between mean of ICC and mean of current student model),
- \* **random** procedure.

SIETTE also uses the weights for each topic to assure **content balanced** tests.

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## SIETTE: Test generator

### 2. Updating the temporary student model

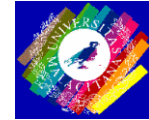
Once the student has given his/her answer, SIETTE computes his/her new proficiency level and updates the student model.

### 3. Termination criterion

Is selected by test developers, and can be any valid combination of the following cases:

- \* The standard deviation of student's knowledge distribution is smaller than a fixed value
- \* The probability of having a knowledge greater than  $k$  is over a certain level.
- \* The system has already posed a maximum number of questions in a test.
- \* The system has posed at least the minimum number of questions of each topic

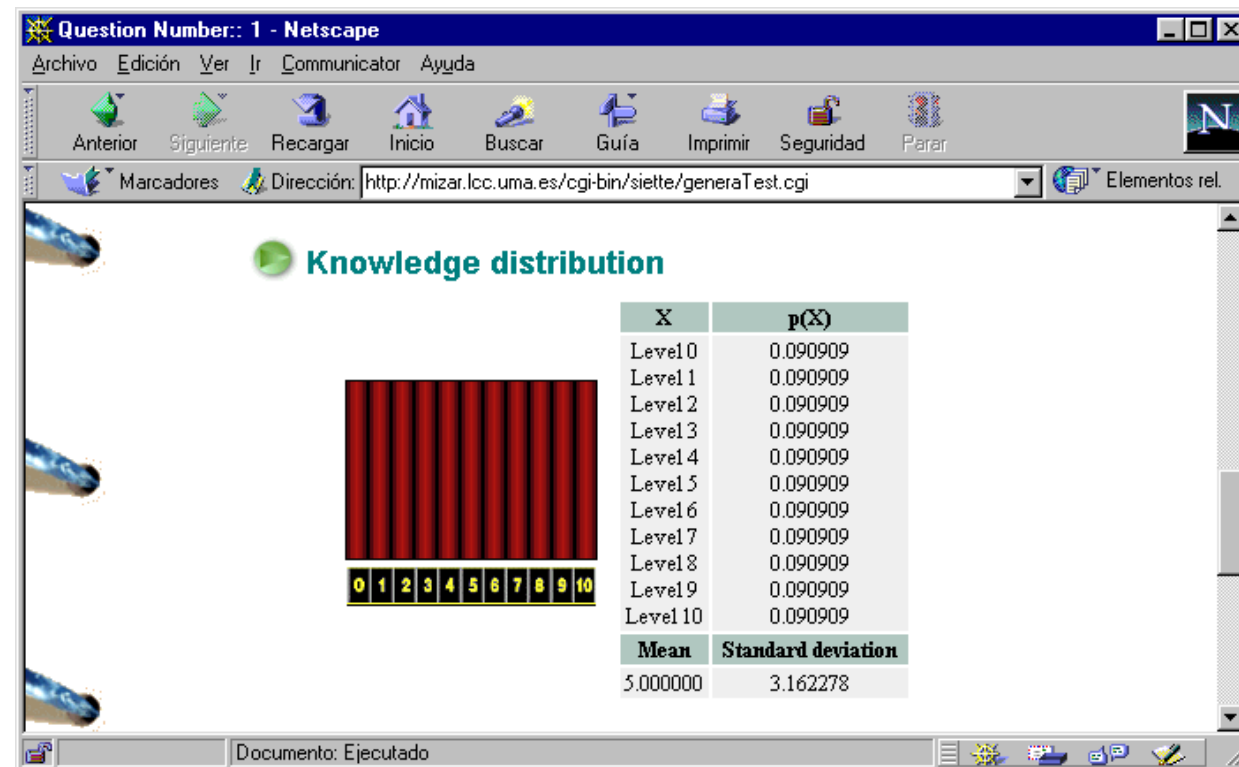
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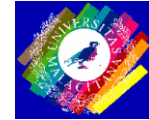
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## Example

Initialization of the temporary student model:



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## Example

### First question and its ICC

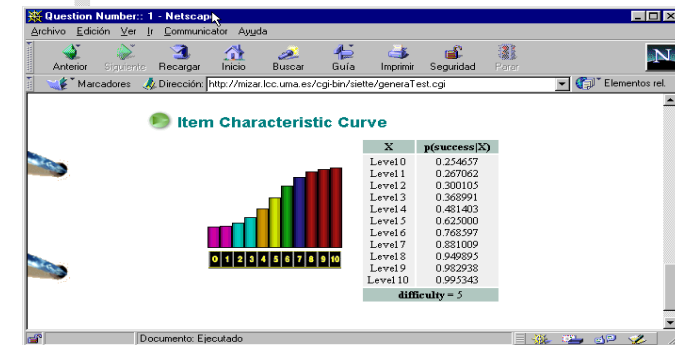
Question Number: 1

Which is the specie in the following photos?

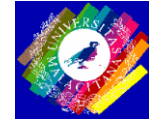
[Medium resolution](#) [Medium resolution](#)  
[High resolution](#) [High resolution](#)

Salix atrocinerea  
 Larix russica  
 Quercus robur brutia  
 Crataegus monogyna

Continue



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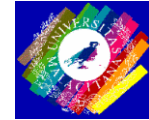
## Example

Intermediate state (after seven questions)

The screenshot displays two overlapping browser windows. The left window, titled 'Question Number: 8', contains a question: 'Which of the following photos shows the species Cupressus sempervirens?'. Below the question are four photographs of different trees, each with a radio button for selection. A 'Continue' button is located at the bottom of the question area. The right window, titled 'Question Number: 0', displays a 'Knowledge distribution' graph. The graph shows a bar chart with a peak at level 8. Below the graph is a table with the following data:

X	p(X)
Level 0	0.000000
Level 1	0.000000
Level 2	0.000000
Level 3	0.000000
Level 4	0.000000
Level 5	0.000000
Level 6	0.000213
Level 7	0.038410
Level 8	0.464595
Level 9	0.441968
Level 10	0.024813
Mean	
Standard deviation	
8.452760	0.612776

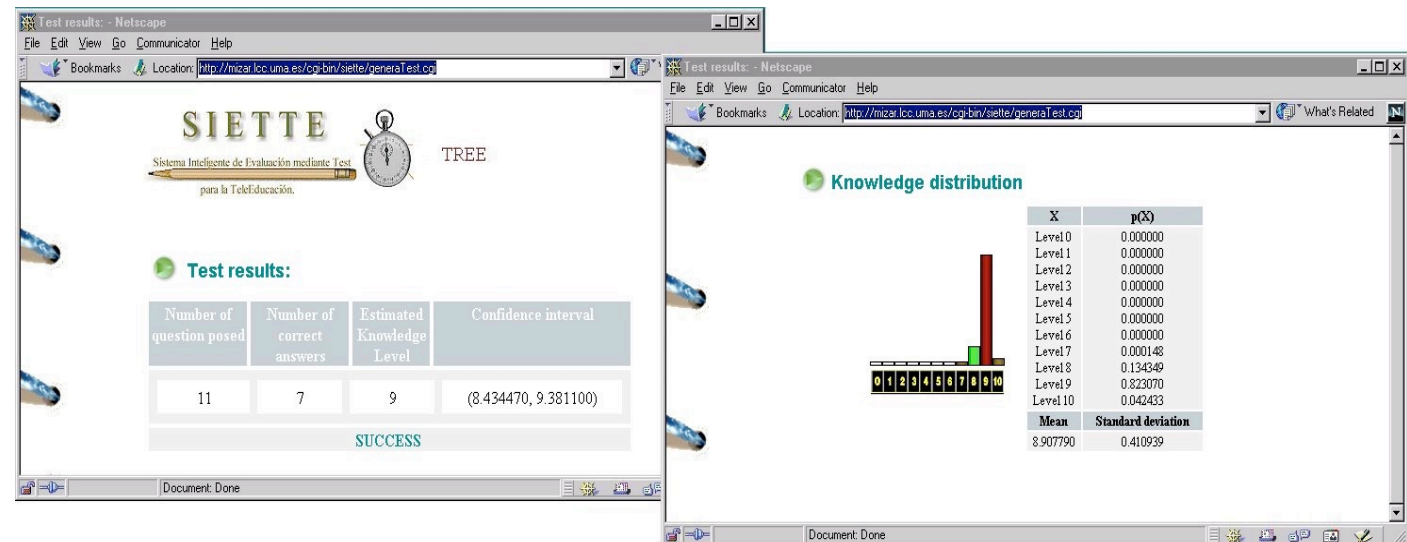
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## Example

### Final state



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## Conclusions

- ◆ We have developed a web-based tool to assist teachers in evaluation and students in learning and auto-evaluations.
- ◆ The tool can be used by many different users simultaneously.
- ◆ Format and aspect of questions are adaptable to teachers preferences, and can include multimedia content.
- ◆ Templates can be used to generate a wide number of questions.