Web Framework for Evaluating Handwritten Math Recognition

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Objective

Create a website for compiling and publishing evaluation results for CROHME 2016 (Competition on Recognition of On-line Handwritten Mathematical Expression) [1].

Motivation

LgEval library (in python) used for evaluating structural pattern recognition systems: command line tools (bash). LgEval was developed at RIT & IRCCyN (France).

Our new web framework makes user easier to view and organize results produced by LgEval.

Framework Design Pattern

Model describes the data structure or database schema. Developer provide the Model.

View is the output representation of information. Determines what a user sees after execute the function.

View and the Template map the Model to an URL.

Fig 1. MVC Design Pattern [2]

Django act as Controller to handle the browser request and interact with Model and View.
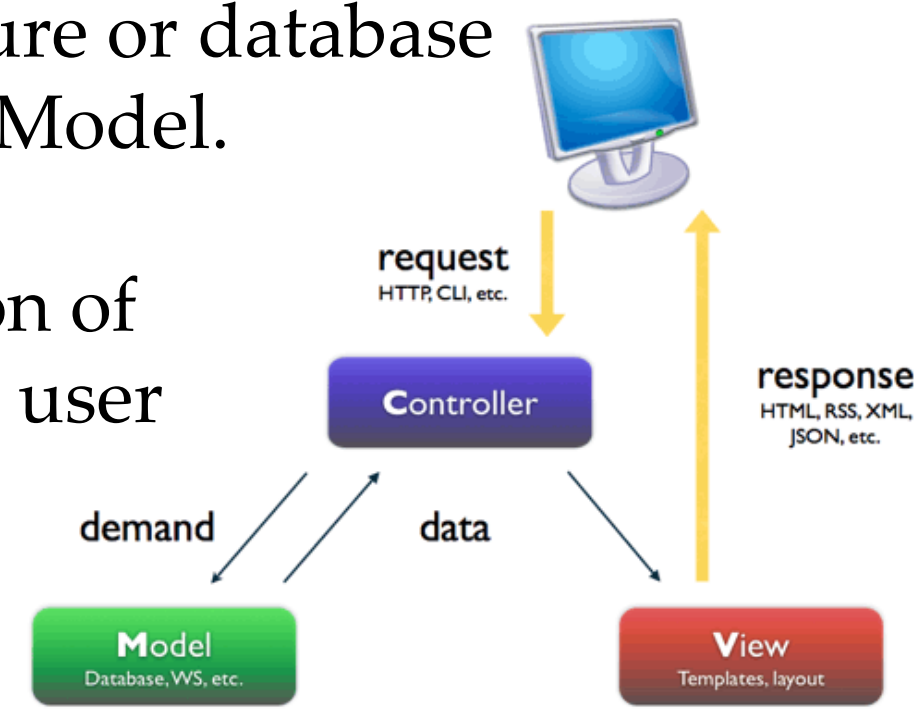
Development Tools

Programming Language: Python 2.7
Web Framework: Django 1.9
Database: SQLite
Evaluation Tool: LgEval Library
Front-end: HTML, CSS, JavaScript
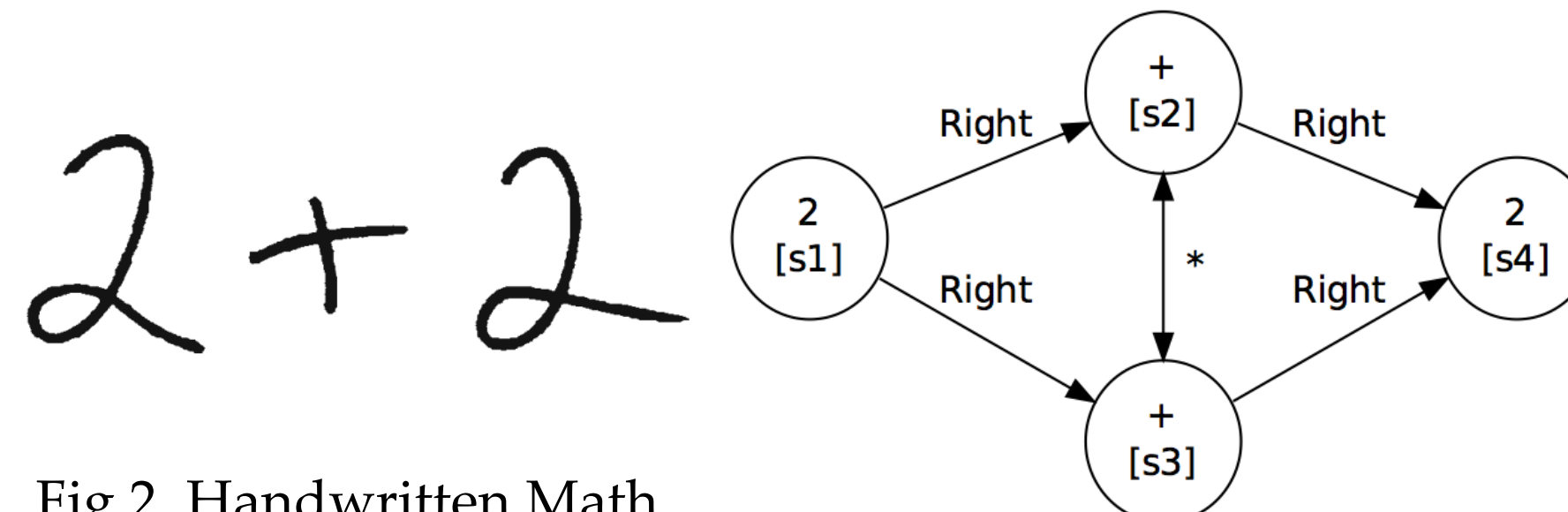
Evaluation Metrics

Fig 2. Handwritten Math Equation Example

Fig 3. Stroke Label Graph [1]

Stroke Label Graph for '2+2' written with four strokes. Each strokes is represented by a node, named by s1-s4.

Each node is labeled with the symbol class the stroke belongs to.

Edges between nodes could identify both the segmentation and spatial relationships between symbols.
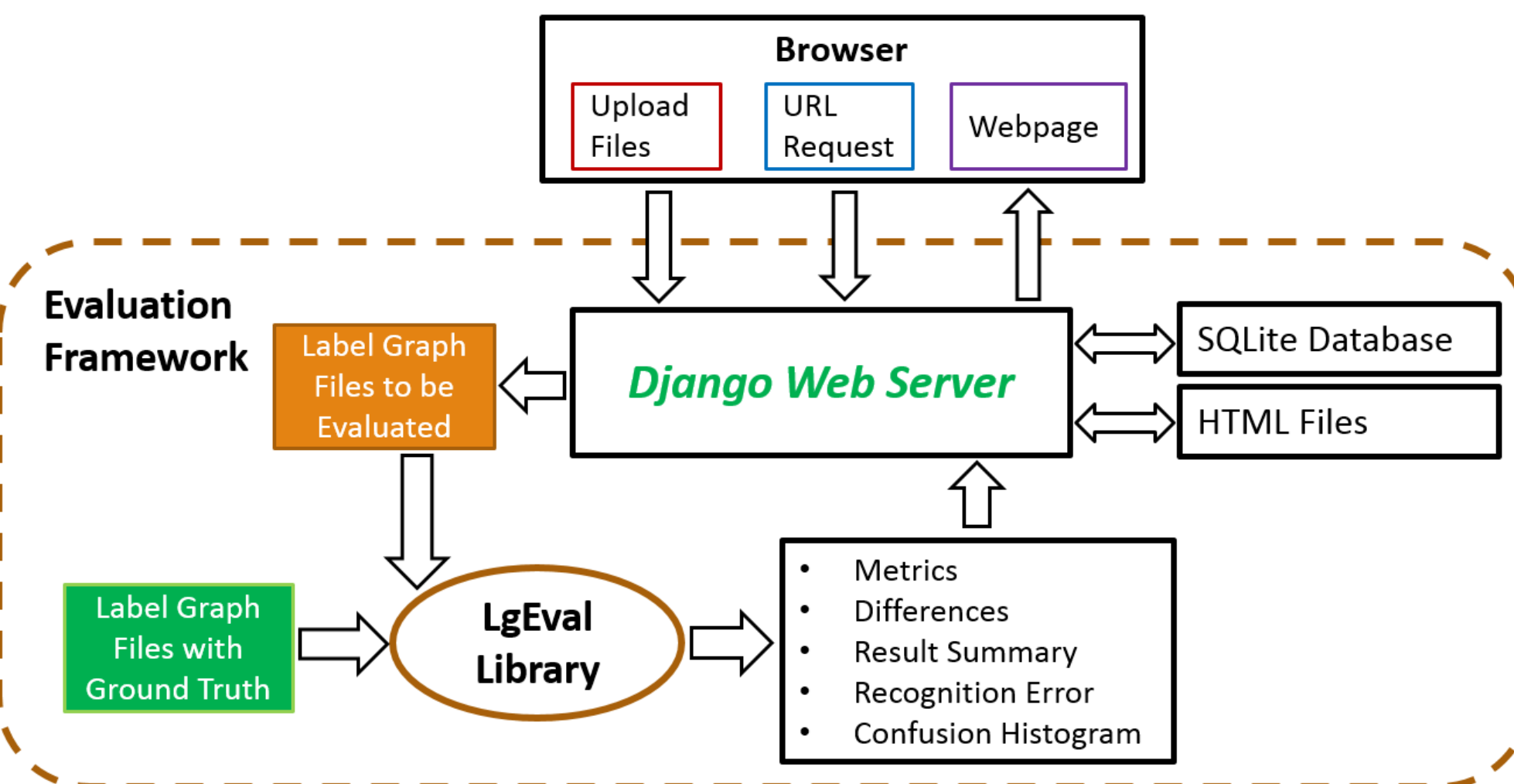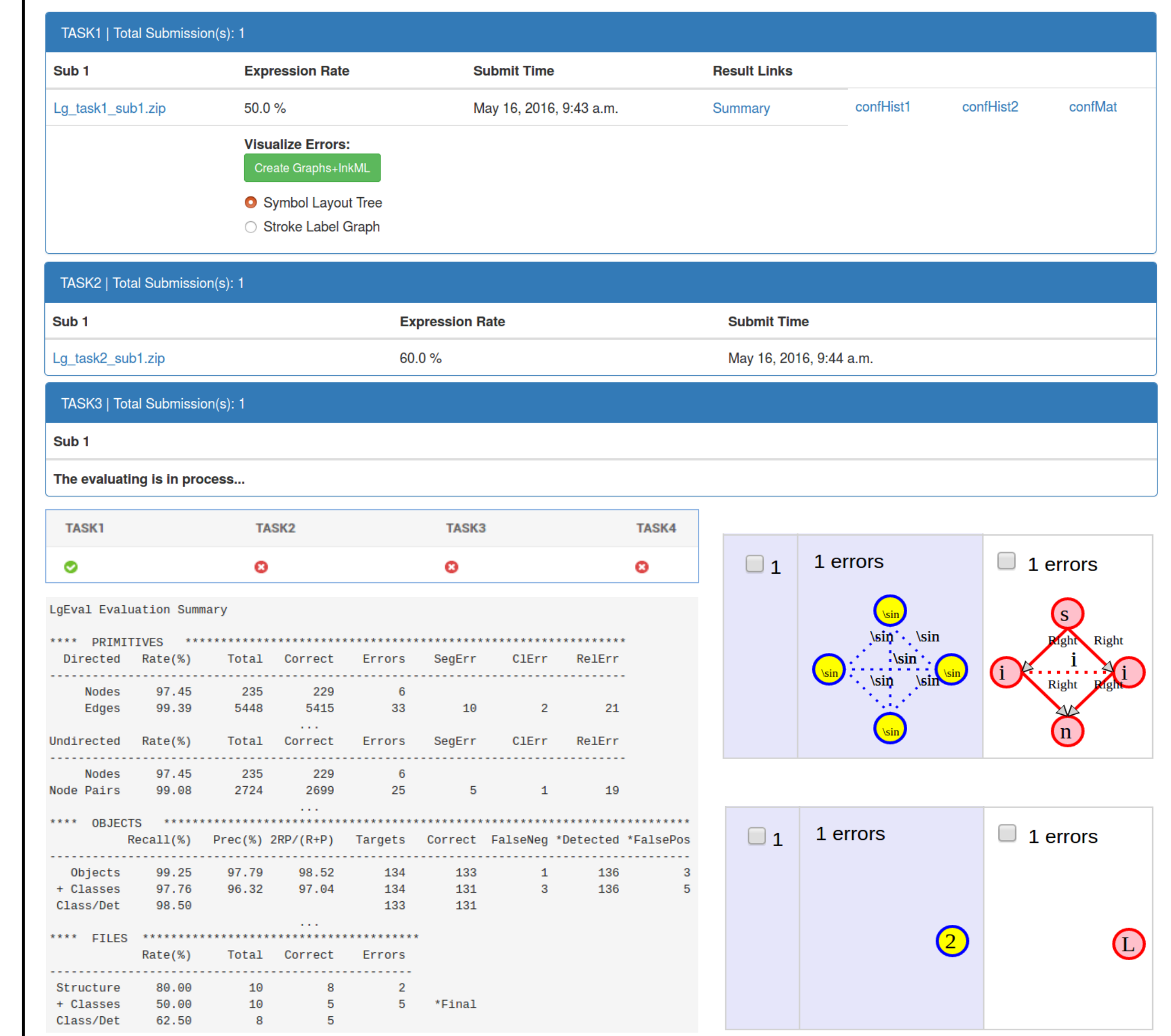
System Structure

Fig4. System Structure

Organizers can upload ground truth; Participants can upload recognizer results. *Format*: .lg files or .zip archive.

LgEval library is an independent module. Produces the summary, confusion histogram and confusion matrices.

Interface

Conclusion

Transparency: each individual evaluating process could run separately and let the users feel that the server is just working on his/her task alone.

Accuracy: the result from the web framework is consistent with the one produced from command line.

References

[1] Mouchère, H., Zanibbi, R., et al. "Advancing the state of the art for handwritten Math recognition: the CROHME competitions, 2011–2014." International Journal on Document Analysis and Recognition (IJDAR) (to appear 2016): 1-17.
https://www.cs.rit.edu/~rlaz/files/CROHME_revision.pdf
[2] https://docs.djangoproject.com/en/1.9