Maestoso: Triumphant and Heroic Sketch Recognition for Music Education

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Motivation

- Improve music education opportunities
- Create music education application that utilizes sketch-recognition
- My father is learning how to play guitar yet he does not know how to read music so this project is dedicated to him so that he may one day learn how to read music

Goals

- Recognize musical shapes such as notes, rests, clefs, accidentals
- Apply the recognition to an educational interface
- Be able to check user responses and provide feedback to the user
- Create sample question before expanding features

Related Work

MUSIC APPLICATIONS

- Coursera, NotateMe, Music Notepad, Music Hand, NoteFlight Crescendo

SKETCH RECOGNITION

- PaleoSketch, LADDER, Scribble Intentions

EDUCATION INTERFACES

- Mechanix, Hashigo, iCanDraw, MathPad²

Implementation

INTERFACE

- Text Panel – Displays text, questions, and challenges
- Draw Panel – User sketches responses to questions and challenges
- Results Panel – Displays "CORRECT" or "TRY AGAIN" after user presses the save followed by the check button
- Interaction Panel – Provides buttons such as clear, undo, save, and check, as well as color selector

RECOGNITION

- $1 , Hausdorff Algorithms for recognizing music shapes

ANSWER MATCHING & FEEDBACK

- Save() method that creates an XML file from user response
- isEqual() to check equality between objects. compareDocument() method that compares the user response to a stored Answer XML file.
- Parser that creates an Answer object from an XML file

Results

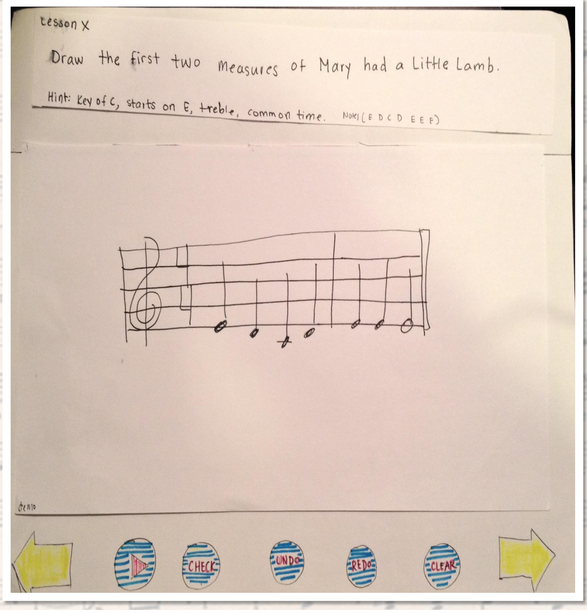
Maestoso can successfully recognize the following

- Treble and Bass Clef, Key Signatures, Time Signatures, Sharp Accidentals, Flat Accidentals, Natural Accidentals, Beamed Eighth notes, Eighth notes with flags, Dotted Eighth Notes, Quarter Notes, Dotted Quarter Notes, Half Notes, Dotted Half Notes, Whole Notes, Dotted Whole notes, Eighth rests, Dotted Eighth rests, Quarter rests, Dotted Quarter rests, Half rests, Dotted Half rests, Whole rests, Dotted Whole rests, Single Bar lines, Double Bar lines

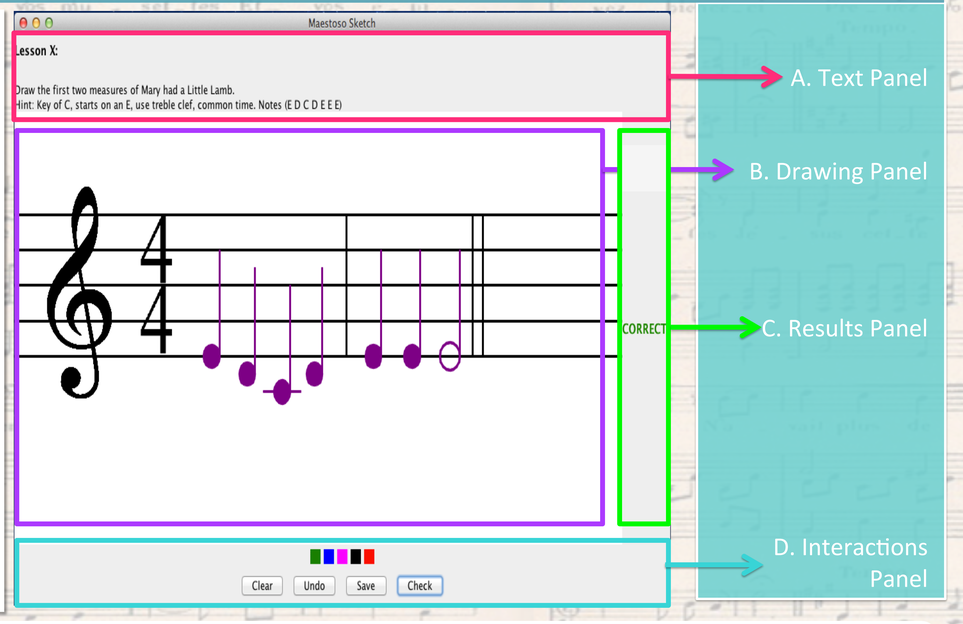
Maestoso is able to check user responses

- Successfully translates the recognized music shapes into an XML data type.
- Using the XML file created by the recognized music shapes, Maestoso checks the accuracy of the user's response by comparing the Answer objects generated after parsing the user response XML to the pre-saved Answer XML

Maestoso Paper Prototype Interface



Maestoso Interface



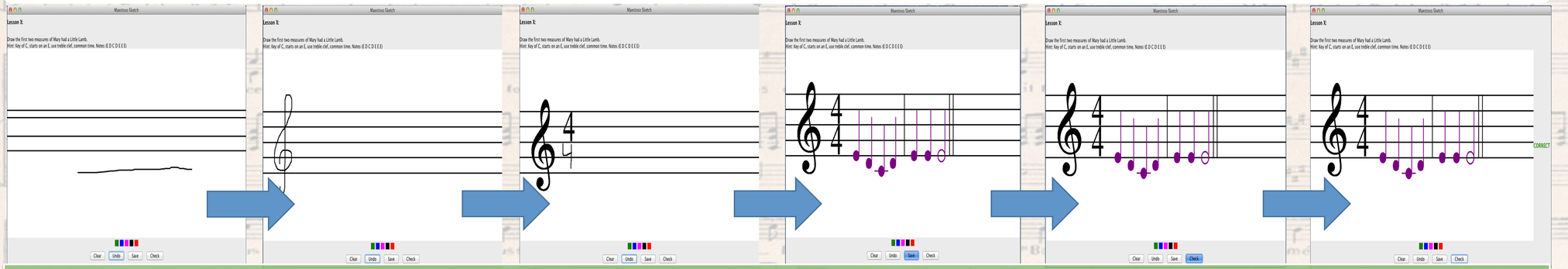
Discussion

- Creates a new educational domain that utilizes sketch recognition for the purpose of teaching
- Necessary to expand the list of domains that takes advantage of the advances made in sketch recognition
- Improves methods available for learning how to read and write music

Future Work

- Note appearance more similar to hand-drawn notes
- User studies
- Implement any suggested changes from users
- Add playback user input features
- Add more lessons
- Make mobile version
- Plugin for Coursera

Process of Answering a Question on Maestoso



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