# DCU Converters
# DCU Translator

# MathsAccess4All

# Converters Objective

The main target of this project is developing a hassle-free, easy to use, external library independent conversion system.

# **Achievements**

During the Euromath project, two converters and two translators were developed by DCU as follows:

UEB2MathML

MathML2UEB

html2 Braille

Braille 2html

# UEB2MatML & MathMlL2UEB specification

a) Developed in JavaScript

b) Converting UEB to MathML and vice-versa works based on replacing and parsing.

c) In contrast to LIBLOUIS, it is not a translator to support text documents, due to many restrictions to deal with mathematical concepts and a large number of contractions in UEB Dictionary this converter does not support embedded mathematical expressions. These two converters Just support mathematical expression, not text or contraction

- The second stage is responsible for parsing the obtained ASCII string from left to right and convert it to the appropriate MathML.

- Besides the size of the symbols group that defines conversion order, another priority system has been considered. Based on this priority system, symbols are converted as the following Indicators, Terminators, Closures, unit and currency, Operators, and alphanumeric symbols.

# Recommandation

To obtain better results and avoid ambiguity the below points must be considered

- For   fraction put numerator and denominator separately in the bracket
- For   polynomial expressions put subscript and superscripts separately in  the bracket
- Do   not use radical sign without ending
- Do   not use space in the UEB input expression
- Just  apply to translate mathematical expressions don't use text or contraction

# Implementation UEB2MathML

- is responsible for converting mathematical expressions from UEB to MathML to be navigable using MathJax.

- This version accepts a stand-alone mathematical equation and does not convert embedded equations wrapped with ordinary text.

- Instead of using LIBLOUIS tables, a dictionary includes more than 300 Braille symbols and their ASCII corresponding version made by DCU.

- In the first stage, the converter initially replaces all Braille symbols group to their ASCII equivalent, and then the single symbols are applied.

- Since UEB creates many technical (mathematical and technical) concepts utilizing the vast range of combinations of single symbols, therefore in the replacing mode initially the group of UEB symbols is converted for example the indicator for capital word is made of the indicator for capital letters. Consequently, it's required for the group of symbols are converted before single individual symbols.

# Interface for testing

uesb2mathml.html and mathml2ueb.html are used to provide a communication environment and feedback facility for the user. For example, ueb2mathml.html contains 3 boxes and 3 buttons. Boxes are respectively assigned to input(UEB) output(MathML) mathematical professional view in the browser.

Buttons for SUBMIT and report CORRECT/WRONG./

# Testing Dataset & self Evaluation

More than 200 common mathematical expressions have been  collected from many resources  in  the school curriculum

- Algebra,

- Shapes,

- Terminology,

- Geometry

- Function (Integral & Logarithm )

# Testing Dataset & self Evaluation

1. DUXBURY converted them to 6DOT-BRAILLE

2. SET  DUXBURY  TO :(document-translation table-math notation)

3. UEB2MATHML converted them MATHML (Appendix B)

4. MATHML2UEB  converted them  to UEB( Appendix A)

5. UEB,  manually  compared to UEB which made from   DUXBURY

6. Check MATHML in Firefox and manually compared them to initial collected datanu

# html2Braille & Braille2html Translators specification

Developed by java using LIBLOUIS file2brl, English configuration file and many tables for translation and back translation

A User writes text and formulae in the Euromath application document using Ascii math, Unicode Math editor or braille editor. Ctr+P print braille document. Text is converted to braille using DCU translator and formulae are converted with MathML2UEB. For both text and formulae, DCU also provided back translation.