VoiceOverM²L

"Talk the Math"

Introdução

Pretendem-se tornar perceptíveis as representações convencionais da simbologia matemática para indivíduos com necessidades especiais. Assim, partindo da representação de uma expressão matemática numa linguagem de anotação (*MathML),* converte-se esta para dois formatos distintos: um destinado à vocalização através de motores TTS (*text to speech*) e outro contendo meta informação sobre a expressividade do texto produzido, em formato anotado (*SSML*).

Implementação

MathML

$$\sqrt[3]{\frac{3^{5x}}{\sum_{i=1}^{9} 6i}}$$

root index three of fraction with numerator beggining of power three to the power of five x end of power and denominator summation with lower bound i equals one and upper bound nine of six i end of summation end of fraction end of root

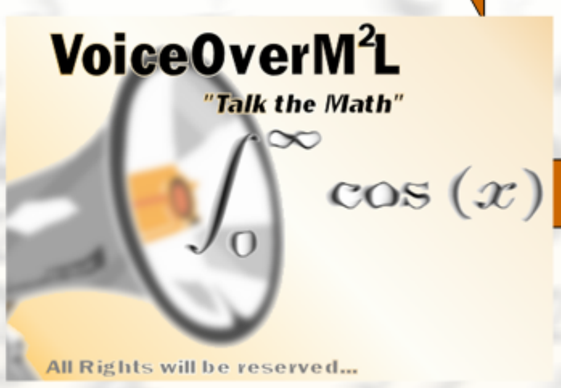
SSML

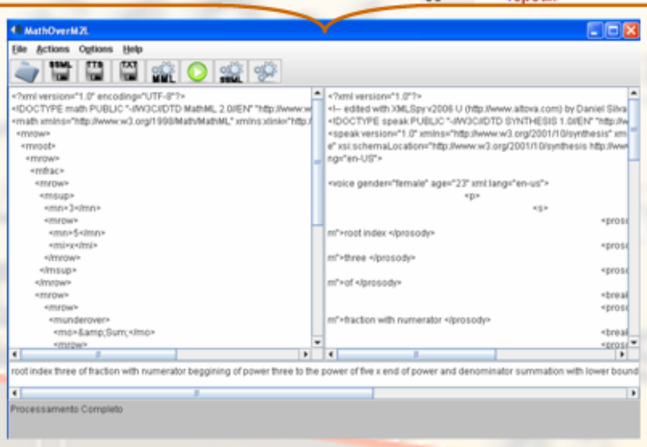
```
<?xml version="1.0"?>
<!-- edited with XMLSpy v2006 U (http://www.altova.com) by Daniel Silva (FEUP) -->
<!DOCTYPE speak PUBLIC "-//W3C//DTD SYNTHESIS 1.0//EN" "http://www.w3.org/TR/speech-synthesis/synthesis.dtd">
<speak version="1.0" xmlns="http://www.w3.org/2001/10/synthesis" xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xsi:schemaLocation="
http://www.w3.org/2001/10/synthesis http://www.w3.org/TR/speech-synthesis/synthesis.xsd" xml:lang="en-US">

<voice gender="female" age="23" xml:lang="en-us">
    <p>
        <s>
            <prosody pitch="medium" rate="medium" volume="medium">root index </prosody>
            <prosody pitch="medium" rate="medium" volume="medium">three </prosody>
            <prosody pitch="medium" rate="medium" volume="medium">of </prosody>
            <break/>
            <prosody pitch="medium" rate="medium" volume="medium">fraction with numerator </prosody>
            <break/>
            <prosody pitch="medium" rate="medium" volume="medium">beggining of power </prosody>
            <break/>
            <prosody pitch="medium" rate="medium" volume="medium">three </prosody>
            <prosody pitch="medium" rate="medium" volume="medium">to the power of </prosody>
            <break/>
            <prosody pitch="medium" rate="medium" volume="medium">five </prosody>
            <prosody pitch="medium" rate="medium" volume="medium">x </prosody>
            <break/>
            <prosody pitch="medium" rate="medium" volume="medium">end of power </prosody>
            <break/>
            <break/>
            <prosody pitch="medium" rate="medium" volume="medium">and denominator </prosody>
            <break/>
            <prosody pitch="medium" rate="medium" volume="medium">summation </prosody>
            <prosody pitch="medium" rate="medium" volume="medium">with lower bound </prosody>
            <prosody pitch="medium" rate="medium" volume="medium">i </prosody>
            <prosody pitch="medium" rate="medium" volume="medium">equals </prosody>
            <prosody pitch="medium" rate="medium" volume="medium">one </prosody>
            <break/>
            <prosody pitch="medium" rate="medium" volume="medium">and upper bound </prosody>
            <prosody pitch="medium" rate="medium" volume="medium">nine </prosody>
            <break/>
            <prosody pitch="medium" rate="medium" volume="medium">of </prosody>
            <break/>
            <prosody pitch="medium" rate="medium" volume="medium">six </prosody>
            <prosody pitch="medium" rate="medium" volume="medium">i </prosody>
            <break/>
            <prosody pitch="medium" rate="medium" volume="medium">end of summation </prosody>
            <break/>
            <break/>
            <prosody pitch="medium" rate="medium" volume="medium">end of fraction </prosody>
            <break/>
            <break/>
            <prosody pitch="medium" rate="medium" volume="medium">end of root </prosody>
            <break/>
        </s>
    </p>
</voice>
</speak>
```

ALTOVA® xmlspy® 2006

NC 1.6.0

Free TTS





Conclusão

O projecto contempla a conversão de um ficheiro em *MathML* (validado na aplicação) para dois tipos de ficheiros. É já suportada uma gama considerável do domínio da matemática (aritmética, trigonometria, operadores complexos entre outros), bem como a tradução para linguagem natural em dois idiomas distintos. A exportação em formato anotado de voz segue algumas considerações a nível linguístico.

A arquitectura modular usada no projecto permite evoluções diversas, a nível dos domínios da matemática, suporte a um maior número de idiomas, criação de novas interfaces que usem paradigmas diversos de interacção pessoa-computador.

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