PA193 Project Documentation

GPS Parser

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1 Introduction

Main goal of project it to program parser for GPS coordinates in human readable form. Various formats are supported, as described later. Program accepts two ways of input. These are command line input and input from file. Processed coordinates are visualised in form of dots in SVG image.

2 Input

2.1 Input source

As said before, two possibilities of input are supported. These are distinguished by command line parameter to program. when parameter is present, then it is considered as path to file with input and program tries to open file with given filepath. Other option is to run program without parameter and then program accepts command line input. In this mode, every input is considered to be coordinate and is procesed this way. To end input from command line enter *quit*. Program supposes every new coordinate on new line, multiple coordinates on one line are not supported.

2.2 Coordinates formats

There are 18 different supported formats. Commonly used ∘ is substituted with **D**, because degree symbol isn't part of 8-bit ASCII table, only the extended one. This could problems with flaweless operation of program on different platforms, so we decided to use capital letter D instead. Formats are:

- dd:mm:ss[NS] ddd:mm:ss[WE]
- dd:mm.mmmmm[NS] ddd:mm.mmmmm[WE]
- ddDmm'ss"[NS] dddDmm'ss"[WE]
- ddDmm.mmmmm'[NS] dddDmm.mmmmm'[WE]
- dd.dddddd[NS] ddd.dddddd[WE]
- dd.ddddddD[NS] ddd.ddddddD[WE]
- (-)dd:mm:ss (-)ddd:mm:ss
- (-)dd:mm.mmmmm (-)ddd:mm.mmmmm
- (-)ddDmm'ss" (-)dddDmm'ss"
- (-)ddDmm.mmmmm' (-)dddDmm.mmmmm'

- (-)dd.dddddd (-)ddd.dddddd
- (-)dd.ddddddD (-)ddd.ddddddD
- [NS]dd:mm:ss.sss [WE]ddd:mm:ss.sss
- [NS]dd:mm.mmmmm [WE]ddd:mm.mmmmm
- [NS]ddDmm'ss" [WE]dddDmm'ss"
- [NS]ddDmm.mmmmm' [WE]dddDmm.mmmmm'
- [NS]dd.dddddd [WE]ddd.dddddd
- [NS]dd.ddddddD [WE]ddd.ddddddD

whitespaces Each of these formats can be padded with any amount of spaces before and after. Between longitude and latitude must be at least one space. No other whitespace characters are supported and no whitespace characters are allowed inside of longitude or latitude declaration.

Coordinates dimensions In case of real numbers, any number of numerals behind dot is supported, but only first six in case of degrees and first five in case of minutes are counted in final result, since such precision if more than enough with current GPS systems. Also there is required at least one numeral after comma, so 49.0D 16.0D is valid, but 49D 16D is not. This applies to all similar formats.

latitude Latitude cannot exceed 90◦ as it is considered as overflow, ad generally there isn't place on earth with latitude greater than 90◦. Hemispheres of the Earth can be specified either with capital letters (**N** or **S**) or minus sign for south, as specified with each of the formats.

longitude Longitude cannot exceed 180◦ for same reasons as latitude. And hemisperes can be specified as previously, but different letters (**E** or **W**) or minus sign for east.

2.3 Coordinates examples

- 49:12:34N 016:36:00E
- 49:12.577N 16:36.006E
- 49D12'34"N 16D36'00"E
- 49D12.577'N 16D36.00'E
- 49.21096N 16.59796E

- 49.21096DN 16.59796DE
- 49:12:34 016:36:00
- 49:12.577 16:36.006
- 49D12'34" 16D36'00"
- 49D12.577' 16D36.00'
- 49.21096 16.59796
- 49.21096D 16.59796D
- N49:12:34 E016:36:00
- N49:12.577 E16:36.006
- N49D12'34" E16D36'00"
- N49D12.577' E16D36.00'
- N49.21096 E16.59796
- N49.21096D E16.59796D

3 Output

There are two output formats, one is SVG file, which contains dots representing coordinates on Earth surface.[1] Other output is just text which is produced after all coordinates are processed.

4 Summary

Whole project is quite large (about 5000 lines of code) which is caused by forbidden use of regular expresions. Thus pattern recognition to one format from eighteen possible and the verifiacion of this format showed up to be quite complex task. We tried to use automata based programing for this task, which caused code to be longer than normally would be expected. On the other hand, we hope that this solution will lead to more secure way of input procesing.

[1] Not all browsers display SVG file correctly, Google Chrome is recomended