JULIA CODE GENERATOR FOR FLOWGORITHM FLOW CHART INTERPRETER

Gajendra Deshpande, KLS Gogte Institute of Technology, India

https://gcdeshpande.github.io

Contents

- Flowgorithm Julia Code Generator
- The Generation Z
- Using Julia on Android
- Conclusion and Future goals

Motivation

- We get students from diverse background i.e., whose primary medium of study is not English, rural and economically weaker section of the society.
- Programming course is introduced as the one of the first courses in Engineering study in India.
- I have seen students struggling to understand the programming concepts and often stuck between syntax and semantics of the language.

Background

- Although there are many tools such as Alice, Scratch etc. but more formal tools were needed to aid in assessment.
- The Flowgorithm flow chart interpreter where flow charts can be drawn and executed. Also code generation option is present and flow charts are one of most widely used tool for problem solving and understand the program flow.
- The flowgorithm supports 18+ languages but lacks the support for Julia language. There was a need to add the support of Julia language to Flowgorithm if we wanted to introduce Julia as first programming language for problem solving.

Flowgorithm –Flow Chart Interpreter

- The Flowgorithm generates Julia code from the flow chart. I have created a template based on existing templates for Flowgorithm to generate the Julia code.
- It is very simple to use. Just draw the flow chart, select the Julia template to generate the code and execute the flow chart to view the result.
- This tool is very helpful for non-native English speakers who are interested to learn problem solving and programming without worrying much of syntax and errors.

GitHub Repository: https://github.com/gcdeshpande/Julia-Code-Generator

Flowgorithm –Flow Chart Interpreter

- Language: Keywords, extension
- Literals
- Expressions: Operator precedence
- Intrinsic and Extrinsic functions
- Program : Define different blocks of the program including decision making and loops
- In case of user defined functions, the implementation needs to be included in the template

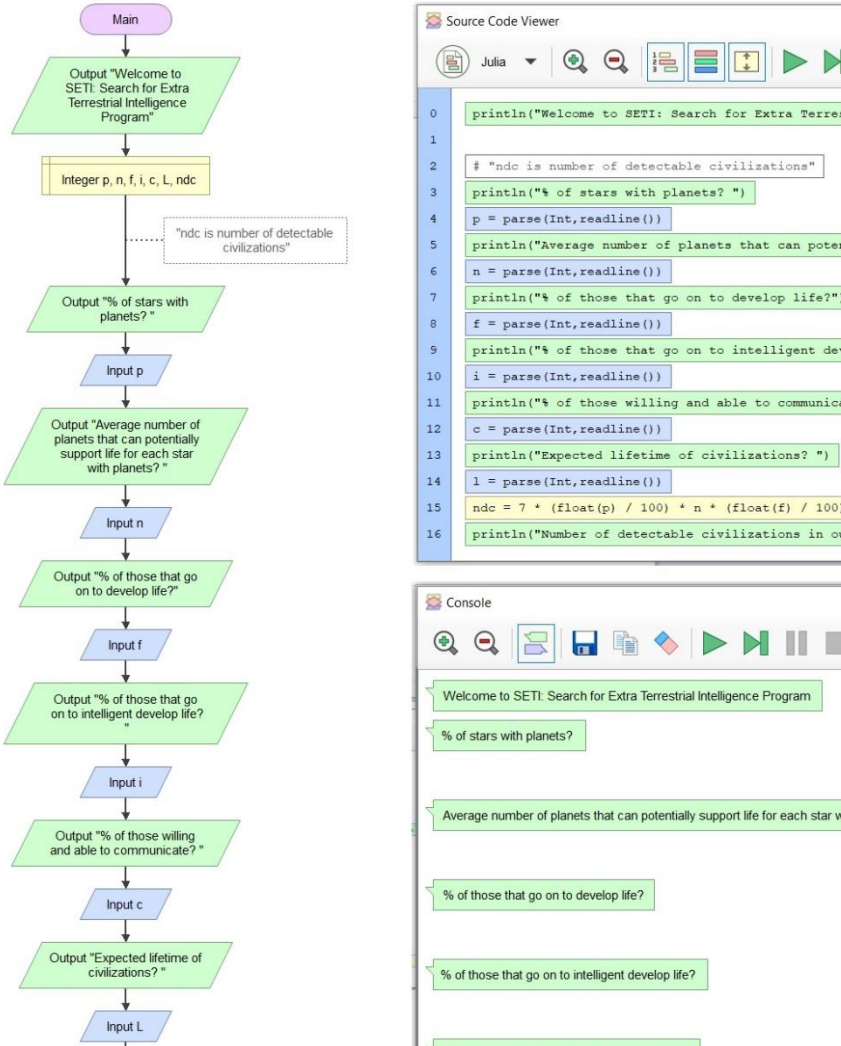
Flowgorithm –Flow Chart Interpreter

Advantages

- Easy to use, drag and drop and corresponding code generation
- Beginner friendly and great tool to learn problem solving

Disadvantages

- Code generation is limited. For example 2 or more dimensional arrays are not supported
- Language specific features (.*) are not supported
- Presently no support for Indic languages



Source Code Viewer

Julia

```
println("Welcome to SETI: Search for Extra Terrestrial Intelligence Program")

# "ndc is number of detectable civilizations"
println("% of stars with planets? ")
p = parse(Int,readline())
println("Average number of planets that can potentially support life for each star with planets? ")
n = parse(Int,readline())
println("% of those that go on to develop life?")
f = parse(Int,readline())
println("% of those that go on to intelligent develop life? ")
i = parse(Int,readline())
println("% of those willing and able to communicate? ")
c = parse(Int,readline())
println("Expected lifetime of civilizations? ")
l = parse(Int,readline())
ndc = 7 * (float(p) / 100) * n * (float(f) / 100) * (float(i) / 100) * (float(c) / 100) * l
println("Number of detectable civilizations in our galaxy is " + str(ndc))
```

Console

```
Welcome to SETI: Search for Extra Terrestrial Intelligence Program
% of stars with planets?
40
Average number of planets that can potentially support life for each star with planets?
2
% of those that go on to develop life?
5
% of those that go on to intelligent develop life?
3
```

The Generation Z, BYOD and Education

- Gen Z : born between 1995 and 2010
- More Tech Savvy
- Learn best by doing/creating
- Teachers need to be equipped with the technology

People born from 1995 to 2010—are true digital natives: from earliest youth, they have been exposed to the internet, to social networks, and to mobile systems.

With BYOD you are creating a 1:1 classroom. Students bring and use their choice of technological devices in the classroom.

BYOD: Advantages and Disadvantages

CISCO DevNet- Securing and increasing productivity of BYOD in classrooms at schools (AICTE India)

The benefits of BYOD

- Your students know the device
- Technology has many possibilities
- Cutting-edge devices
- Cost Effective
- Learning outside the school hours
- Respect for the device
- Organized students

Disadvantages of BYOD

- Students without devices
- Different devices
- Distraction
- Not-responsible student

Austria, USA, Estonia, Australia, Finland, Norway, Portugal, Switzerland, UK

Installing Julia on Android

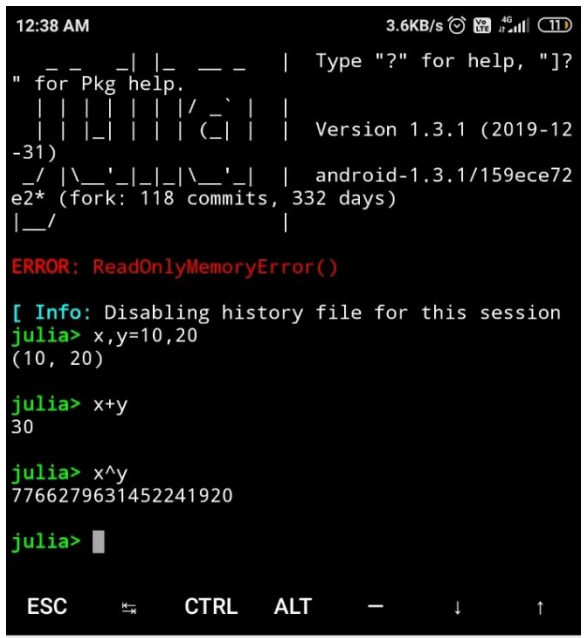
- Install Termux
- Install Ubuntu (Ubuntu in Termux or pointless repo on GitHub)
- Install Julia

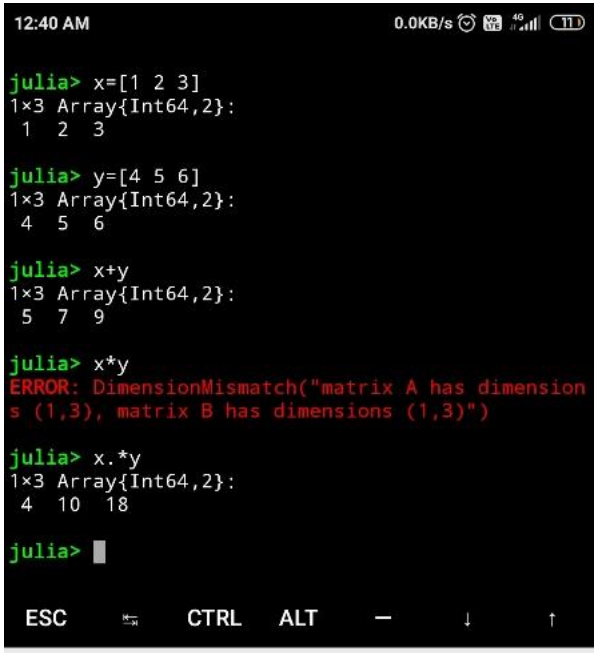
- Hacker's Keyboard (For better typing)

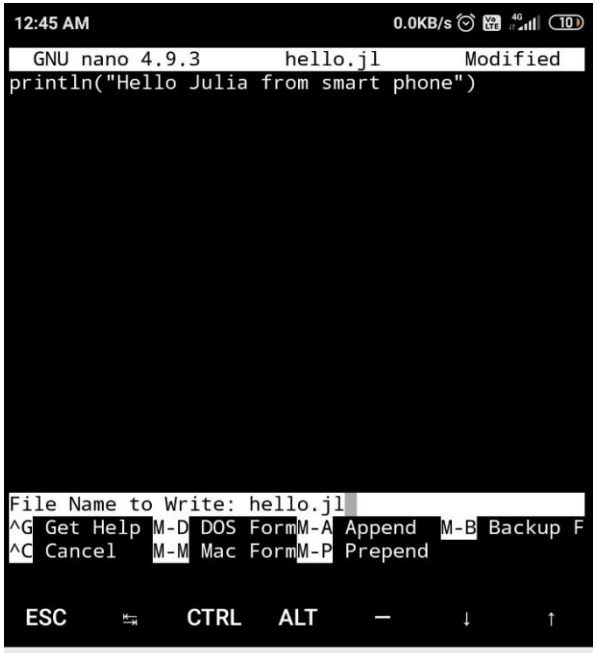
Source: https://discourse.julialang.org/t/using-julia-on-android/8086/9


12:23 AM
1.9KB/s
root@localhost:~# julia
Documentation: https://docs.julialang.org
Type "?" for help, "]?" for Pkg help.
Version 1.4.1
Ubuntu julia/1.4.1+dfsg-1
julia>
ESC
CTRL
ALT


12:36 AM
0.0KB/s
Setting up suitesparse (5.6.0) ...
Setting up clang (10.0.0-1) ...
Setting up julia (1.3.1) ...
$ julia
Documentation: https://docs.julialang.org
Type "?" for help, "]?" for Pkg help.
Version 1.3.1 (2019-12-31)
android-1.3.1/159ece72e2* (fork: 118 commits, 332 days)
ReadOnlyMemoryError()
julia> println("hello Julia from smart phone")
hello Julia from smart phone
julia>
ESC
CTRL
ALT


12:38 AM
3.6KB/s
Type "?" for help, "]?" for Pkg help.
Version 1.3.1 (2019-12-31)
android-1.3.1/159ece72e2* (fork: 118 commits, 332 days)
ERROR: ReadOnlyMemoryError()
[Info: Disabling history file for this session
julia> x,y=10,20
(10, 20)
julia> x+y
30
julia> x^y
7766279631452241920
julia>
ESC
CTRL
ALT


12:40 AM
0.0KB/s
julia> x=[1 2 3]
1×3 Array{Int64,2}:
1 2 3
julia> y=[4 5 6]
1×3 Array{Int64,2}:
4 5 6
julia> x+y
1×3 Array{Int64,2}:
5 7 9
julia> x*y
ERROR: DimensionMismatch("matrix A has dimension
s (1,3), matrix B has dimensions (1,3)")
julia> x.*y
1×3 Array{Int64,2}:
4 10 18
julia>
ESC
CTRL
ALT


12:45 AM
0.0KB/s
GNU nano 4.9.3 hello.jl Modified
println("Hello Julia from smart phone")
File Name to Write: hello.jl
^G Get Help M-D DOS Form M-A Append M-B Backup F
^C Cancel M-M Mac Form M-P Prepend
ESC
CTRL
ALT


12:45 AM
0.0KB/s
$ nano hello.jl
$ julia hello.jl
Hello Julia from smart phone
$
ESC
CTRL
ALT

Conclusion and Future Goals

- Flowgorithm is a great tool for learning problem solving and programming.
- You can add a new programming language support based on existing template files.
- Flowgorithm is available in multiple languages. But lacks the support for Indian languages. In the future scope, I will add Indian language support that will help many students to learn programming at their early age.
- Julia for Blockly
- Code Visualization tools
- More gamified tools to enhance learning

http://www.flowgorithm.org

Thank You!