Ask Programs Aloud -
Making (Programming) Concepts Naturally Accessible at a Distance

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A. I. overtaking humans

$10^{170} > \text{number of all atoms in the universe}$
Geoffery Hinton once said:

In science, you can say things that seem crazy, but in the long run they can turn out to be right. We can get really good evidence, and in the end the community will come around.

“The Father of Deep Learning using Neural Networks”

My ex-colleague at University of Toronto
Image Classification

>98% accurate

MK Hackathon last weekend with Neil Smith

Courtesy to Festive Roads and MKHackathon.org

https://github.com/yijunyu/festive-road-tagging/tree/master/tensorflow
Vision for the Visually Disabled

- Teaching programming concepts to visually impaired learners:
  - Can programs be heard instead?
  - Can teaching become chatbot dialogues?
- A new pedagogy on programming

Embracing the future: in many ways, the future is already upon us !!!
Comprehension

• Software are invisible
  • Users understand by observing their behaviours
    E.g., Powerpoint, Keynote are software
• Their presentation, programs, are visual
  • Programmers understand by reading their structures
    E.g., 10 million lines of code
• A gap between software and programs:
  • Are we teaching programming in a right way?
Hello, world!

Do you see it as a software?
No, we are no machines!
You have to “explain” the program in “natural” language.
Hello, world!

```java
public class Hello {
    public static void main(String args[]) {
        System.out.print("Hello, world!\n");
    }
}
```

• This is a software that displays a message “Hello, world!” on the screen.

• It is written in Java programming language, therefore, you need a Java compiler to convert into byte code that will be executed by a Java virtual machine.

• Any Java application like this one must implement a “main” method, encapsulated by a class, as the entrance of the main thread of control.

• ...
Better we have a dialogue

- What does the software do?
  - It displays a message “Hello, world!” on screen.

- How does it achieve this (function) ?
  - In the “main” method, it calls a “System” library function to “print” the string “Hello, world!” to standard “output” channel, which is the console screen of the computer running this program.
We are in an era of A.I.

• How many of you have heard of “Alexa”? 

Customers have also enabled

- Insult Generator
  - “Alexa, ask insult generator to generate an insult.”
  - 31 stars

- Worlds Best Knock Knock Jokes
  - “Alexa, ask best knock knock to tell me a joke”
  - 12 stars
We are in an era of A.I.

• How many of you have heard of “Alexa”? 

Q & A

Next generation of interactive computer marked assessments (iCMAs)
Cross-Language Learning for Program Classification using Bilateral Tree-Based Convolutional Neural Networks

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Figure 3: BiTBCNN architecture for program classification

Program Chairs
Prem Devanbu  
University of California, Davis
William Cohen  
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Program Committee
Earl Barr  
University College, London
Jacob Devlin  
Google
Doug Downey  
Northwestern University
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UT Dallas
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University of Edinburgh
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NL for SE @ AAAI 2018  
https://nl4se.github.io
Program classification

Queries over 90% accurate
Teaching at a distance – a new form of iCMA