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# Theorem prover Isabelle
## in the teaching of natural and mathematical sciences

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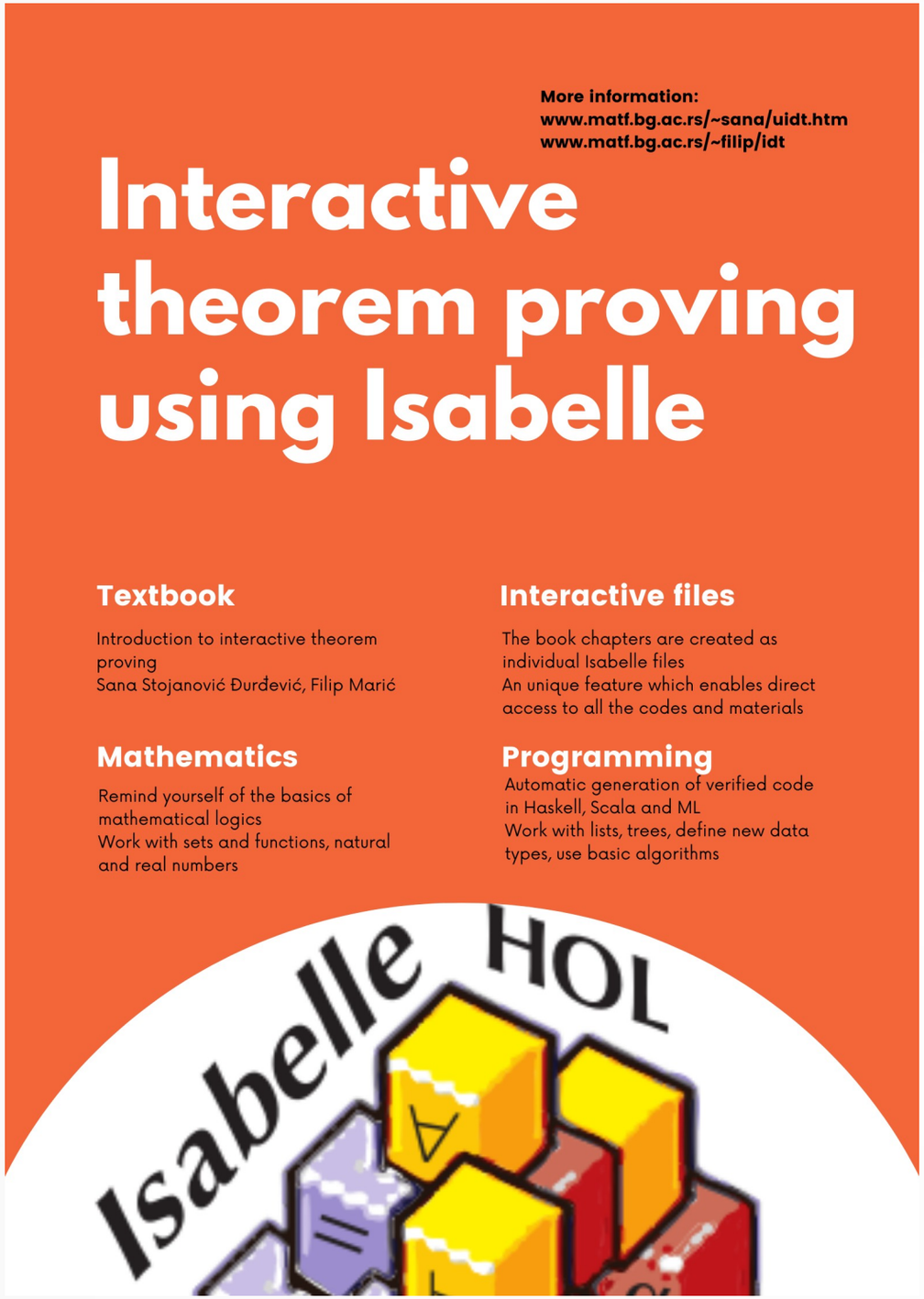
# Overview

- Interactive theorem prover Isabelle
  - Two levels of writing interactive proofs proofs:
    - Script proofs (apply rule)
    - Isar proofs (proof, assume, show,...)
  - Very rich notation, close to classical mathematics
  - Support for functional programming and formal software verification




- Course “Professional Development in Educational Interaction and Communication”
  - Gent University
  - Belgrade and Korce
- Theme 3 - Poster
  - A forgotten learning and communication approach

## Textbook

Introduction to interactive theorem proving
Sana Stojanović Đurđević, Filip Marić

## Interactive files

The book chapters are created as individual Isabelle files
An unique feature which enables direct access to all the codes and materials

## Mathematics

Remind yourself of the basics of mathematical logics
Work with sets and functions, natural and real numbers

## Programming

Automatic generation of verified code in Haskell, Scala and ML
Work with lists, trees, define new data types, use basic algorithms

# Theme 5 – Animations as an interaction and communication strategy

url: http://poincare.matf.bg.ac.rs/~sana//uidt/Isabelle_animation.mp4

# Introduction to interactive theorem proving

- New course, third year (2018)
- Detailed documentation is created
  - Isabelle files, exercises, video materials
  - Textbook - PDF file (333 pages) in Serbian only
- Individual work (Problems from International Mathematical Olympiad Short List with Solutions)
  - Challenging task
  - Github repository (over 60 different problems formalized - with solution, and over 100 problems formalized – without solution)
- Number of students is rising (15, 30, 60)

# Challenges

- IV year of bachelors studies – Informatics
  - Students that want to work in the industry
  - Limited contact with formal mathematics
- Online classes
- Interaction is necessary!!!
- Starting with very easy examples, just to get them hooked (within the first week)
- Creating complementary material

# Solutions

- Whole material is created directly in Isabelle
  - Individually created theories (individually checked) that correspond to different chapters
  - Every Isabelle file that is independent from others
  - Student has a unique opportunity to test the material directly
  - Easy to test, change and master it step by step
- http://poincare.matf.bg.ac.rs/~sana//uidt/uidt.pdf