

# Data and Knowledge Engineering for Intelligent Systems

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- 1 Computer Science in Würzburg, Summer School
- 2 Country and City: Germany, Würzburg
- 3 Research Aspects

# Computer Science

Computer science is used in many application areas, including business, industry, and internet.



Professor Aja (Shih-Chieh) Huang from NTNU is a co-author of the game playing program AlphaGo.

In Würzburg, we have are investigating the internet, information systems, software engineering, aerospace technologies, and we have a study program on Games Engineering.

# Computer Science in Würzburg

the University of Würzburg has about 30.000 students,  
the city has about 130.000 inhabitants

CS Studies (each including a Thesis)

<i>Type</i>	<i>Years</i>
<i>Bachelor</i>	3–4
<i>Master</i>	2–3
<i>PhD</i>	3–5

CS Topics

- Databases, Artificial Intelligence, Semantic Web
- Software Engineering, Algorithms, Hardware
- Aerospace, Human Computer Interaction

# Summer School

Topic: Advanced Database and Logic Programming Concepts

- September 17–21, 2017
- a 5-day summer school for students and PhD students
- a complete schedule will be announced until May 2017
  - usually teaching in the morning,
  - exercises/labs in the afternoon

Co-Located with the Conference Declare

<http://www.declare17.de>

# Germany – Castle in Würzburg (Bavaria)



# Residency in Würzburg



# Capital of Germany – Berlin, Brandenburg Gate





# East Germany – Dresden



# South Germany – Neuschwanstein



# Information Systems

*Modern intelligent and web-based information systems* frequently need to integrate hybrid knowledge bases, containing, e.g.,

- relational / deductive,
- semi-structured, NoSQL,
- semantic web / linked open data.



We are investigating declarative and domain-specific languages for information systems.

# Multi-Paradigm Programming

- Traditional, *imperative* programming languages tell the computer exactly how to accomplish a desired goal.



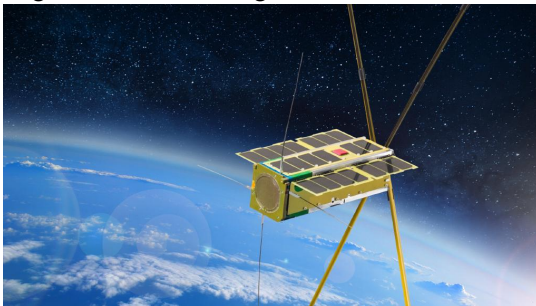
# Multi-Paradigm Programming

- Modern, *declarative* programming languages will only have to specify the desired goal to the computer, e.g.
  - Database Languages,
  - Rules in Decision Support,
  - Semantic Web (ontologies).
  
- Imperative programming languages can profit from declarative specifications.
  
- We investigate integrations of declarative concepts into popular imperative languages, such as Java, JavaScript, and Python.

# Applications

## Aerospace

- High-Level Planning in Nano Satellites

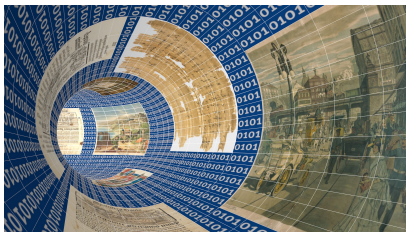


- Code Analysis with Abstract Syntax Trees for C++

# Applications

## Digital Humanities

- Collaborative Morpheme Annotation
- Kallimachos (digital libraries)



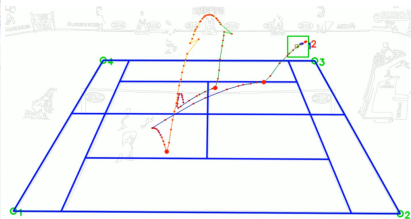
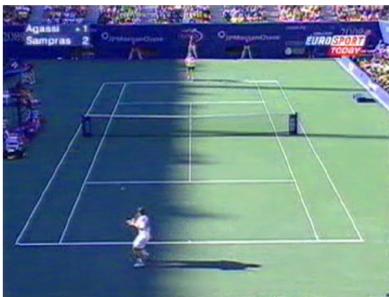
## Rule Bases for Expert Systems

- diagnosis in industry and medicine

# Further Applications

## Sports

### ■ Image Recognition – Ball Trajectories in Tennis



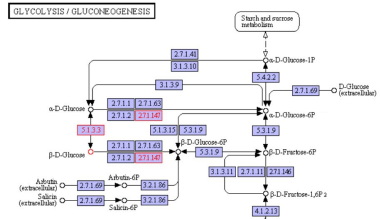
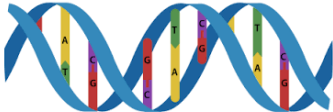
### ■ Decision Support – Analysis of Tactical Behaviour



# Further Applications

## Bioinformatics

- Language and Genome
- Metabolic Pathways, Drug Design



# Further Applications

## Industry

- Root Cause Analysis in Computer Networks
- Business Rules in E-Commerce

```
if 'Processes in ERP System' = partly
then 'Processes in other Software' = partly .
```

```
if 'Existence of other Software' = yes
and 'Functionality of other Software' = increasing
and 'Acceptance of other Software' = increasing
then 'Acceptance of ERP System' = decreasing .
```

```
if 'Use of other Software' = increasing/constant
then 'Acceptance of ERP System by Users' = decreasing .
```

# Declare

Conference and Summer School

[www.declare17.de](http://www.declare17.de)

Würzburg, September 2017



Thanks for your attention !