

Seminar Software Quality

Preliminary meeting

We will start at 3:02 pm

Fabian Leinen (Orga)

Jakob Rott Markus Schnappinger Roland Würsching

Dr. Andreas Stahlbauer Lena Gregor Raphael Nömmer



Software Quality





Quality of Code, Data and Models



Participating



Apply via matching tool

Application with us: Online form

- Letter of motivation
- Study program and semester
- Optional: CV + grade report
- Your 2+ favorite topics

•**IIISL** <u>http://go.tum.de/070420</u>

ТП

CQSE



February 14th



Grading

Thesis

- Seminar paper: max. 15 pages (text)
- Content: Theory + application of the topic (results, experiences, problems and limitations)
- Initial submission
- Final submission: 1 week after presentation

TIM CQSE •MSg

Presentation

- 20 min + 10 min discussion
- Mandatory dry run (1 week before seminar)





Questions about the organization?

TIM CQSE •MSG



Clone Detection:

"Where can identical (copied) parts be found in source code?"

```
// Utilities for arrays of elements
II Utilities for arrays of elements.
public String showElements(ModelElement[] elements, String nomsg) {
                                                                      public String showElements(ModelElement[] elements, String nomsg) {
  boolean found = false;
                                                                         boolean found = false;
  StringBuffer res = new StringBuffer();
                                                                         StringBuffer res = new StringBuffer();
  if (elements != null) {
                                                                         if (elements != null) {
                                                                           Index.getInstance().setCurrentRenderer(
    Index.getInstance().setCurrentRenderer(
         FlatReferenceRenderer.getInstance());
                                                                                FlatReferenceRenderer.getInstance());
    for (int i = 0; i < elements.length; i++) {</pre>
                                                                           for (int i = 0; i < elements.length; i++) {
       ModelElement el = elements[i];
                                                                              ModelElement el = elements[i];
                                                                              res.append(showElementLink(el)).append(HTML.LINE_BREAK);
       res.append(showElementLink(el)).append(HTML.LINE_BREAK);
       found = true;
                                                                              found = true;
    Index.getInstance().resetCurrentRenderer();
                                                                           Index.getInstance().resetCurrentRenderer();
  if (!found & nomsg != null & nomsg.length() > 0) {
                                                                         if (!found && nomsg.length() > 0) {
    res.append(H1ML.italics(nomsg));
                                                                           res.append(HTML.italics(nomsg));
  return res.toString();
                                                                         return res.toString();
```

```
// Utilities for arrays of elements
public String showElements(ModelElement[] elements, String nomsg) {
  boolean found = false;
  StringBuffer res = new StringBuffer();
  if (elements != null) {
    Index.getInstance().setCurrentRenderer(
         FlatReferenceRenderer.getInstance());
    for (int i = 0; i < elements.length; i++) {</pre>
       ModelElement el = elements[i];
       res.append(showElementLink(el)).append(HTML.LINE_BREAK);
       found = true;
    Index.getInstance().resetCurrentRenderer();
  if (!found && nomsg != null && nomsg.length() > 0) {
    res.append(HTML.italics(nomsg));
  return res.toString();
3,
```





			<u> </u>	2 Design and and appendix in the set of		a contract of the second	· · · · · · · · · · · · · · · · · · ·	_	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	1.1.1	===	and the second second
	· · · · · · · · · · · · · · · · · · ·					the second se		the second se			a statement of the state of the	
			E EFerneren				100000000000000000000000000000000000000			a second second second		1707201000000
				1				and the second s				
					and the second se					and a second second second second		
	.:											
			and the second se	A REAL PROPERTY OF A REAL PROPER								1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
112		the second se										
		a second s		and the second second second		and the second se	and the second se					
				1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1				1.1		1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		
		1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1				1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1					and the second second second second	<u> </u>
						A CONTRACTOR OF						<u> </u>
	States									==		
	a set the second second second second	and the second second second	· · · · · · · · · · · · · · · · · · ·	===				1000 Carlos Carlos Carlos	· · · · · · · · · · · · · · · · · · ·	the second se		
						In the second second second second second second second						
						a second s			The second se			· · · · · · · · · · · · · · · · · · ·
III	· · · · · · · · · · · · · · · · · · ·											
		the second s										
			The second second second second second				and the second s					
	a ter anna anna		and the second se							and the second se		
				A REAL PROPERTY AND A REAL PROPERTY.				the second se				
	000000000000000000			and the second sec		a second to the second second to the	The second second second	and the second se	and the second se		the second s	
·		and the second second second second		and the second second second second					1 Contractor of the local division of the lo	and the second se		
			and the second second			1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1				COLUMN THE REAL PROPERTY OF	·	·
				-							1	. —
		100 C		L.—	III				=			
	10 March 10				a set increase and our real set in							
· · ·						1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1						
·	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		CONTRACTOR OF STREET,								-	
	· · · · · · · · · · · · · · · · · · ·			E								
				[==		1 A A A A A A A A A A A A A A A A A A A		· · · · · · · · · · · · · · · · · · ·	the second s	<u>. </u>		
· · ·				1.800				and a second second second second			a second a second a second as a second as	
·				L					10 mm			
					a second second second	· · · · · · · · · · · · · · · · · · ·					2.22.2	
		1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1			the second s	State of the local division of the local div						
				F=						and the second se		
· · ·		the second se		<u> </u>		and the second se	Construction of the local division of the lo				1 Plant and a state of the second sec	
		Comments of the second s		[=====================================					.=		1	
									Ŀ			
and the second se				·			1 <u>1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 </u>	L			<u> </u>	
· · · · · · · · · · · · · · · · · · ·			· · · · · · · · · · · · · · · · · · ·		-							
and the second se		a not service land	: <u>:</u>	1	and the second s							<u> </u>
		the second se	a second s									
						and some international states where we are a set of			8 mm		I II and the second second second	E COMPANY AND AND A
			and the second s		the second se	and the second se				= <u>=</u>		a service and a service and a
										the second se		
		100 M		1 <u>·</u>		and the second s						· · · · · · · · · · · · · · · · · · ·
		A REAL PROPERTY AND A REAL PROPERTY.						E ===				
100 million (1997)	-							_	and the second secon			
			and the second s	[]	Ŀ							
						10/07/04100-00						
·		and the second second second								a series and a series of the s		
	·			1 -								
				1 ·		=				a sea a sea		
				Ŀ							a new party of the second s	Contraction of the local division of the loc
		a set of the set of th		· · · · · · · · · · · · · · · · · · ·	I There are served	===	and the second second second		1.00			101000
and the second second										The second s		
					E ===							
						A REAL PROPERTY AND A REAL PROPERTY.				·		
						A REAL PROPERTY AND ADDRESS OF ADDRESS OF ADDRESS OF ADDRESS ADDRE				and the second se		
		E				the second s				and the second se		the second se
		I HAR DESIGNATION AND ADDRESS OF A DESIGNATION OF A DESIGNATIONO OF A DESIGNATIONO OF A DESIGNATIONO OF A DE				the second se				Long Street Street		
			1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1									
						100 C	11				the second s	the second second
								A DECEMBER OF THE OWNER.				
										All of the second secon		
·					the second se			22222222222222222				
		1. A.	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		1. A			1				
		and the second se	and the second second second									
I		Commence and the second				A REAL PROPERTY AND A REAL		CONTRACTOR OF A DESCRIPTION OF A DESCRIP		and the second second		
· ·		the second s								10,000		
	and the second s		And and a subscription of the	and the second se	the second se			and the second				<u> </u>
	Contraction of the local division of the loc				1							
	and the second second second								and the second			
		==				·				and the second second		
						. —				a second second second		
	A REAL PROPERTY AND ADDRESS OF	A REAL PROPERTY AND A REAL PROPERTY.								a second second second second		
	and the second second second second	And the Party of t		and the second se		;		and the second second				
===									_	_		
		The second se			and a survey of the part of th		1					
					100 M		A REAL PROPERTY OF A REAL PROPERTY OF					
	<u>. </u>										and the second s	
	Laurence 1	.=	I III IIII IIII IIII IIII IIII IIII IIII				a search as a search as					the second se
		<u>. </u>		A DECK OF THE OWNER AND ADDRESS OF THE OWNER ADDRESS OF THE			and the second sec					
		k										
====				The second s	the second second	The second s				12 mm	the second se	a for the state state
												1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
	100								a is the set down in the second side			
						The same is a second se						a second s
	2 225					-						
							-					
							A second se					



Maintaining ML Models

Software Lifecycle vs ML Pipeline



What happens after the deployment? How are ML Models maintained?



Topic 2)

Topic 3)

How can I detect that my deployed ML model needs maintenance?

- Reasons for maintenance
- Monitoring techniques
- Detecting performance drops automatically

... and what can I (automatically) do about it?

- Pipelines and techniques
- Limiting factors
- Minimizing manual intervention

Test Deficiency of Open Source Microservice Systems

GitHub







Tests

Microservice Systems



пΠ COSE **Test Impact Analysis**:

"Do I really need to run all the tests again?"





... 4000+ Test Cases that do not cover Changes



Step 1: Test Case Selection



Step 1: Test Case Selection



Step 2: Test Case Prioritization



Step 2: Test Case Prioritization



Test Gap Analysis

"Have all changes since the last release been tested?"



TIM CQSE •MSg

Supporting developers in handling flaky tests in CI



- Non-deterministically failing tests are called *flaky tests*
- Flaky tests hinder efficient continuous integration
- Current solutions mostly limit to rerunning tests
- Data driven solutions tailored to CI
 - Detection
 - Root causing
 - ...

TIM CQSE MSG

Regression Test Optimization of Manual System Tests

Step	Description	Data	Expected Result	Actual Result	Status
1					Pass
2					Pass
3					Fail

How consistent is the test coverage?

How quickly does coverage become **outdated**?

How effective is a change-based **test selection**?

Participating





Apply with us: Online form

- Letter of motivation
- Study Program and Semester
- Optional: CV + grade report
- Your 2+ favorite topics

February 14th

TIM CQSE •MSg

http://go.tum.de/070420

