

Probabilistic Detection of GoF Design Patterns

The results of performing the proposed method compared with DEMiMA [1], Sempatrec [2], GTM [3], and SSA method [4] on five open-source projects, namely JHotDraw 5.1, JRefactory 2.6.24, Junit 3.7, QuickUML 2001, and MapperXML 1.9.7 for Singleton, Factory Method, Composite, Adapter, Observer, and State/Strategy patterns are presented as follows.

Table 1: on Junit 3.7

Design Pattern	#N	Class Name	SSA	DEMiMA	Sempatrec	GTM	Proposed Method
Factory Method	1	junit.samples.money.Imoney	×	×	×	×	0.52
		junit.samples.money.Money					
	2	junit.extensions.TestDecorator	×	×	×	×	0.58
		junit.framework.Test					
	3	junit.samples.money.Imoney	×	×	×	✓	0.82
		junit.samples.money.MoneyBag					
Composite	1	unit.framework.TestSuit	✓	✓	✓	✓	0.98
		junit.framework.Test					
Adapter	1	junit.samples.money.MoneyTest	×	×	×	✓	0.82
		junit.samples.money.MoneyBag					
	2	junit.swingui.TestHierarchyRun View	✓	×	✓	✓	0.99
		junit.swingui.TestSuitePanel					
	3	junit.swingui.TestSuitePanel	✓	×	×	✓	0.98
		junit.swingui.TestTreeModel					
Adapter	4	junit.tests.TestListenerTest	×	×	×	✓	0.86
		junit.framework.TestResult					
Observer	1	junit.framework.TestResult	×	×	×	✓	0.86
		junit.framework.Test					
	2	junit.framework.TestResult	✓	✓	✓	✓	1
		junit.framework.TestListener					
	3	junit.samples.money.MoneyBag	×	×	×	✓	0.92
		junit.samples.money.Money					
State/Strategy	1	junit.tests.TestImplementorTest.DoubleTestCase	✓	×	✓	✓	0.93
		junit.framework.TestCase					
	2	junit.swingui.FailureRun View	✓	×	✓	✓	0.86
		junit.swingui.TestRunContext					
	3	junit.swingui.TestHierarchyRun View	✓	×	✓	✓	0.92
		junit.swingui.TestRunContext					

Table 2: on JHotDraw 5.1

Design Pattern	#N	Class Name	SSA	DEMIMA	Sempatre	GTM	Proposed Method
Singleton	1	CH.ifa.draw.util.Clipboard	✓	✓	✓	✓	0.92
	2	CH.ifa.draw.framework.Figure	✓	✓	✓	×	0.57
Factory Method	1	CH.ifa.draw.framework.Connector	×	×	✓	✓	0.92
		CH.ifa.draw.contrib.PolygonFigure					
	2	CH.ifa.draw.framework.Connector	×	×	×	✓	0.86
		CH.ifa.draw.figures.EllipseFigure					
	3	CH.ifa.draw.framework.FigureEnumeration	×	×	✓	✓	0.91
		CH.ifa.draw.figures.GroupFigure					
	4	CH.ifa.draw.framework.Connector	×	✓	×	✓	0.76
		CH.ifa.draw.figures.PolyLineFigure					
Factory Method	5	C H.ifa.draw.framework.Connector	×	×	×	✓	0.68
		CH.ifa.draw.figures.RoundRectangleFigure					
	6	CH.ifa.draw.framework.Connector	✓	✓	×	✓	0.92
		CH.ifa.draw.standard.AbstractFigure					
	7	CH.ifa.draw.framework.FigureEnumeration	✓	×	×	✓	0.87
		CH.ifa.draw.standard.AbstractFigure					
	8	CH.ifa.draw.framework.FigureEnumeration	×	×	×	✓	0.74
		CH.ifa.draw.standard.CompositeFigure					
Composite	9	CH.ifa.draw.framework.FigureEnumeration	✓	✓	✓	✓	0.99
		CH.ifa.draw.standard.StandardDrawingView					
	10	CH.ifa.draw.framework.FigureSelection	✓	×	×	✓	0.86
		CH.ifa.draw.standard.StandardDrawingView					
	1	CH.ifa.draw.standard.CompositeFigure	✓	✓	✓	✓	0.98
		CH.ifa.draw.framework.Figure					
Observer	1	CH.ifa.draw.figures.PolyLineFigure	×	×	✓	✓	0.96
		CH.ifa.draw.util.StorableInput					
	2	CH.ifa.draw.standard.StandardDrawing	✓	✓	✓	✓	0.98
		CH.ifa.draw.framework.DrawingChangeListener					
	3	CH.ifa.draw.standard.StandardDrawingView	×	×	×	×	0.67
		CH.ifa.draw.framework.Figure					
	4	CH.ifa.draw.standard.StandardDrawingView	×	✓	×	×	0.71
		CH.ifa.draw.framework.Painter					
Adapotor	1	CH.ifa.draw.applet.DrawApplet	✓	×	✓	✓	0.95
		CH.ifa.draw.standard.ToolButton					
	2	CH.ifa.draw.application.DrawApplication	✓	×	✓	✓	0.92
		CH.ifa.draw.standard.ToolButton					
	3	CH.ifa.draw.contrib.PolygonHandle	✓	×	×	✓	0.86
		CH.ifa.draw.framework.Locator					
	4	CH.ifa.draw.figures.GroupCommand	✓	×	×	✓	0.88
		CH.ifa.draw.framework.DrawingView					
Adapotor	5	CH.ifa.draw.figures.InsertImageCommand	✓	×	×	✓	0.91
		CH.ifa.draw.framework.DrawingView					

Table 2: on JHotDraw 5.1 (Cont.)

Design Pattern	#N	Class Name	SSA	DEMIMA	Sempatrec	GTM	Proposed Method
	6	CH.ifa.draw.figures.LineConnection	✓	✓	✓	✓	1
		CH.ifa.draw.framework.Connector					
	7	CH.ifa.draw.figures.RadiusHandle	✓	×	✓	✓	0.92
		CH.ifa.draw.figures.RoundRectangleFigure					
	8	CH.ifa.draw.figures.UngroupCommand	✓	×	✓	✓	0.93
		CH.ifa.draw.framework.DrawingView					
	9	CH.ifa.draw.standard.AbstractFigure	×	×	×	✓	0.85
		CH.ifa.draw.framework.FigureChangeListener					
	10	CH.ifa.draw.standard.AbstractTool	×	×	×	✓	0.92
		CH.ifa.draw.framework.DrawingView					
	11	CH.ifa.draw.standard.AlignCommand	✓	×	✓	✓	0.84
		CH.ifa.draw.framework.DrawingView					
	12	CH.ifa.draw.standard.BringToFrontCommand	✓	×	×	✓	0.87
		CH.ifa.draw.framework.DrawingView					
	13	CH.ifa.draw.standard.ChangeAttributeCommand	×	×	✓	✓	0.96
		CH.ifa.draw.framework.DrawingView					
Adapotor	14	CH.ifa.draw.standard.ChangeConnectionHandle	×	×	×	✓	0.86
		CH.ifa.draw.framework.Connector					
	15	CH.ifa.draw.standard.LocatorConnector	×	×	✓	✓	0.92
		CH.ifa.draw.framework.Locator					
	16	CH.ifa.draw.standard.LocatorHandle	×	×	×	✓	0.87
		CH.ifa.draw.framework.Locator					
	17	CH.ifa.draw.standard.SendToBackCommand	×	×	×	✓	0.88
		CH.ifa.draw.framework.DrawingView					
	18	CH.ifa.draw.standard.StandardDrawingView	×	×	×	×	0.56
		CH.ifa.draw.framework.DrawingEditor					
	19	CH.ifa.draw.standard.StandardDrawingView	×	×	×	×	0.68
		CH.ifa.draw.framework.Drawing					
	20	CH.ifa.draw.standard.StandardDrawingView	×	×	×	✓	0.87
		CH.ifa.draw.framework.Painter					
	21	CH.ifa.draw.standard.ToggleGridCommand	×	×	×	×	0.64
		CH.ifa.draw.framework.DrawingView					
Sate/ Strategy	22	CH.ifa.draw.standard.ToolButton	×	×	×	×	0.68
		CH.ifa.draw.util.PaletteIcon					
	1	CH.ifa.draw.applet.DrawApplet	✓	✓	✓	✓	0.98
		CH.ifa.draw.framework.Tool					
	2	CH.ifa.draw.application.DrawApplication	✓	✓	✓	✓	1
		CH.ifa.draw.framework.Drawing					
	3	CH.ifa.draw.application.DrawApplication	✓	×	×	✓	0.89
		CH.ifa.draw.framework					
	4	CH.ifa.draw.contrib.PolygonHandle	✓	×	×	✓	0.83
		CH.ifa.draw.framework.Locator					
	5	CH.ifa.draw.figures.GroupCommand	✓	×	×	✓	0.91
		CH.ifa.draw.framework.DrawingView					
	6	CH.ifa.draw.figures.InsertImageCommand	✓	×	×	✓	0.86
		CH.ifa.draw.framework.DrawingView					

Table 2: on JHotDraw 5.1 (Cont.)

Design Pattern	#N	Class Name	SSA	DEMIMA	Sempatrec	GTM	Proposed Method
	7	CH.ifa.draw.figures.LineConnection	✓	×	×	✓	0.83
		CH.ifa.draw.framework.Connector					
	8	CH.ifa.draw.figures.PolyLineFigure	×	×	×	×	0.69
		CH.ifa.draw.figures.LineDecoration					
	9	CH.ifa.draw.figures.TextTool	✓	✓	×	✓	0.91
		CH.ifa.draw.standard.TextHolder					
	10	CH.ifa.draw.figures.UngroupCommand	✓	×	×	✓	0.9
		CH.ifa.draw.framework.DrawingView					
	11	CH.ifa.draw.samples.javadraw.Animator	×	×	×	✓	0.87
		CH.ifa.draw.framework.DrawingView					
	12	CH.ifa.draw.samples.javadraw.Animator	×	×	×	✓	0.86
		CH.ifa.draw.util.Animatable					
	13	CH.ifa.draw.standard.AbstractFigure	×	×	✓	✓	0.93
		H.ifa.draw.framework.FigureChangeListener					
	14	CH.ifa.draw.standard.AbstractTool	×	×	✓	✓	0.94
		CH.ifa.draw.framework.DrawingView					
	15	CH.ifa.draw.standard.AlignCommand	×	×	×	✓	0.84
		CH.ifa.draw.framework.DrawingView					
	16	CH.ifa.draw.standard.BringToFrontCommand	×	×	×	×	0.67
		CH.ifa.draw.framework.DrawingView					
	17	CH.ifa.draw.standard.ChangeAttributeCommand	×	×	×	×	0.54
		CH.ifa.draw.framework.DrawingView					
Sate/ Strategy	18	CH.ifa.draw.standard.ChangeConnectionHandle	×	×	×	✓	0.83
		CH.ifa.draw.framework.ConnectionFigure					
	19	CH.ifa.draw.standard.ChangeConnectionHandle	×	×	×	×	0.52
		CH.ifa.draw.framework.Figure					
	20	CH.ifa.draw.standard.ChangeConnectionHandle	×	×	×	×	0.68
		CH.ifa.draw.framework.Connector					
	21	CH.ifa.draw.standard.ConnectionHandle	×	×	×	✓	0.85
		CH.ifa.draw.framework.ConnectionFigure					
	22	CH.ifa.draw.standard.ConnectionHandle	×	×	×	✓	0.88
		CH.ifa.draw.framework.Figure					
	23	CH.ifa.draw.standard.ConnectionTool	×	×	×	✓	0.91
		CH.ifa.draw.framework.ConnectionFigure					
	24	CH.ifa.draw.standard.ConnectionTool	✓	×	✓	✓	0.92
		CH.ifa.draw.framework.Figure					
	25	CH.ifa.draw.standard.ConnectionTool	×	×	✓	✓	0.96
		CH.ifa.draw.framework.Connector					
	26	CH.ifa.draw.standard.CreationTool	✓	×	✓	×	0.87
		CH.ifa.draw.framework.Figure					
	27	CH.ifa.draw.standard.FigureTransferCommand	×	×	×	×	0.66
		CH.ifa.draw.framework.DrawingView					
	28	CH.ifa.draw.framework.DrawingView	✓	✓	✓	✓	0.98
		CH.ifa.draw.framework.Handle					
	29	CH.ifa.draw.standard.LocatorConnector	×	×	×	✓	0.92
		CH.ifa.draw.framework.Locator					

Table 2: on JHotDraw 5.1 (Cont.)

Design Pattern	#N	Class Name	SSA	DEMIMA	Sempatrec	GTM	Proposed Method
	30	CH.ifa.draw.standard.LocatorHandle	×	×	×	✓	0.84
		CH.ifa.draw.framework.Locator					
	31	CH.ifa.draw.standard.SendToBackCommand	×	×	×	✓	0.89
		CH.ifa.draw.framework.DrawingView					
	32	CH.ifa.draw.standard.StandardDrawingView	×	×	×	✓	0.94
		CH.ifa.draw.framework.DrawingEditor					
	33	CH.ifa.draw.standard.StandardDrawingView	×	✓	✓	✓	0.96
		CH.ifa.draw.framework.Drawing					
	34	CH.ifa.draw.standard.StandardDrawingView	×	×	×	×	0.52
		CH.ifa.draw.framework.PointConstrainer					
	35	CH.ifa.draw.standard.StandardDrawingView	×	×	×	×	0.68
		CH.ifa.draw.framework.Painter					
	36	CH.ifa.draw.standard.ToggleGridCommand	×	×	×	✓	0.93
		CH.ifa.draw.framework.DrawingView					
	37	CH.ifa.draw.util.CommandButton	×	×	×	✓	0.84
		CH.ifa.draw.util.Command					
	38	CH.ifa.draw.util.PaletteButton	×	×	×	✓	0.87
		CH.ifa.draw.util.PaletteListener					

Table 3: on JRefractory2.6.24

Design Pattern	#N	Class Name	SSA	DEMIMA	Sempatrec	GTM	Proposed Method
Singleton	1	org.acm.seguin.ide.command.PackageSelectorPanel	✓	×	×	✓	0.86
	2	org.acm.seguin.ide.common.action.CurrentSummary	✓	✓	✓	✓	0.98
	3	org.acm.seguin.ide.common.EditorOperations	✓	×	✓	✓	0.92
	4	org.acm.seguin.ide.common.PackageListFilter	×	×	×	✓	0.82
	5	org.acm.seguin.ide.common.SourceBrowser	✓	×	×	✓	0.84
	6	org.acm.seguin.ide.jbuilder.RefractoryNodeViewerFactory	✓	×	✓	✓	0.85
	7	org.acm.seguin.ide.jbuilder.UMLNodeViewerFactory	✓	×	×	×	0.67
	8	org.acm.seguin.pretty.ai.RequiredTags	×	×	×	✓	0.81
	9	org.acm.seguin.refactor.undo.UndoStack	✓	✓	✓	✓	0.97
	10	org.acm.seguin.refactor.RefactoringFactory	✓	×	×	×	0.56
	11	org.acm.seguin.uml.line.LabelSizeComputation	×	×	×	✓	0.84
	12	org.acm.seguin.version.VersionControlCache	×	×	×	✓	0.86

Table 3: on JRefractory2.6.24 (Cont.)

Design Pattern	#N	Class Name	SSA	DEMIMA	Sempatrec	GTM	Proposed Method
Factory Method	1	org.acm.seguin.refactor.type.TypeChangeVisitor	×	×	×	✓	0.92
		org.acm.seguin.refactor.EliminatePackageImportVisitor					
	2	org.acm.seguin.refactor.type.TypeChangeVisitor	✓	×	×	✓	0.9
		org.acm.seguin.refactor.type.MoveClassVisitor					
	3	org.acm.seguin.refactor.type.TypeChangeVisitor	×	×	×	✓	0.81
		org.acm.seguin.refactor.type.RenameClassVisitor					
	4	org.acm.seguin.ide.jbuilder.UMLNode	×	×	×	✓	0.86
		org.acm.seguin.ide.jbuilder.refactor.MenuBuilder					
	5	org.acm.seguin.refactor.method.ExtractMethodRefactoring	×	✓	×	✓	0.91
		org.acm.seguin.refactor.method.EMBuilder					
	6	org.acm.seguin.ide.jbuilder.UMLNode	×	×	×	✓	0.84
		org.acm.seguin.ide.jbuilder.refactor.MenuBuilder					
	7	org.acm.seguin.refactor.method.AddConstructor	×	×	×	✓	0.85
		org.acm.seguin.parser.build.BuildExpression					
	8	org.acm.seguin.refactor.method.EMBuilder	×	×	×	✓	0.78
		org.acm.seguin.parser.build.BuildExpression					
	9	org.acm.seguin.refactor.method.ExtractMethodRefactoring	×	×	×	✓	0.96
		org.acm.seguin.parser.build.BuildExpression					
	10	org.acm.seguin.refactor.method.ExtractMethodRefactoring	×	×	×	✓	0.84
		org.acm.seguin.refactor.method.EMBuilder					
	11	org.acm.seguin.parser.ast.SimpleNode	×	×	×	✓	0.82
		org.acm.seguin.parser.ParseException					
	12	org.acm.seguin.parser.Token	×	×	×	✓	0.81
		org.acm.seguin.parser.JavaParserTokenManager					
	13	org.acm.seguin.print.xml.State	×	×	✓	×	0.62
		org.acm.seguin.print.xml.AttributeState					
	14	org.acm.seguin.print.xml.State	×	×	×	✓	0.83
		org.acm.seguin.print.xml.TagState					
	15	org.acm.seguin.print.xml.State	×	×	×	✓	0.84
		org.acm.seguin.print.xml.QuoteAttributeValueState					
	16	org.acm.seguin.print.xml.State	×	×	×	✓	0.92
		org.acm.seguin.print.xml.AttributeValueState					
Factory Method	17	org.acm.seguin.print.xml.State	×	×	×	✓	0.78
		org.acm.seguin.print.xml.TextState					
Composite	1	org.acm.seguin.parser.ast.ASTConstructorDeclaration	×	×	×	×	0.67
		org.acm.seguin.pretty.JavaDocableImpl					
	2	org.acm.seguin.parser.ast.ASTNestedInterfaceDeclaration	×	×	×	×	0.52
		org.acm.seguin.pretty.JavaDocableImpl					
Adapter	1	org.acm.seguin.metrics.GatherData	×	✓	×	✓	0.86
		org.acm.seguin.metrics.MetricsReport					
	2	org.acm.seguin.metrics.MethodMetricsFrame	✓	✓	✓	✓	0.98
		org.acm.seguin.summary.MethodSummary					
	3	org.acm.seguin.metrics.PackageMetricsFrame	✓	✓	✓	✓	0.98
		org.acm.seguin.summary.PackageSummary					
	4	org.acm.seguin.metrics.TextReport	✓	✓	✓	✓	0.99
		org.acm.seguin.util.TextFormatter					

Table 3: on JRefractory2.6.24 (Cont.)

Design Pattern	#N	Class Name	SSA	DEMIMA	Sempatrec	GTM	Proposed Method
	5	org.acm.seguin.metrics.TypeMetricsFrame	✓	✓	✓	✓	1
		org.acm.seguin.summary.TypeSummary					
	6	org.acm.seguin.pretty.PrettyPrintVisitor	✓	✓	✓	✓	0.99
		org.acm.seguin.pretty.FieldSizeLookAhead					
	7	org.acm.seguin.pretty.PrettyPrintVisitor	✓	✓	✗	✓	0.95
		org.acm.seguin.pretty.LocalVariableLookAhead					
	8	org.acm.seguin.refactor.AddImportTransform	✓	✗	✗	✗	0.61
		org.acm.seguin.parser.ast.ASTName					
	9	org.acm.seguin.refactor.type.ChangePackageTransform	✓	✓	✗	✓	0.86
		org.acm.seguin.parser.ast.ASTName					
	10	org.acm.seguin.refactor.type.ExtractInterfaceRefactoring	✓	✓	✗	✓	0.84
		org.acm.seguin.refactor.ComplexTransform					
	11	org.acm.seguin.summary.load.SwingLoadStatus	✓	✓	✓	✓	0.98
		org.acm.seguin.tools.install.RefractoryStorage					
	12	org.acm.seguin.tools.install.RefractoryStorage	✓	✓	✓	✓	0.94
		org.acm.seguin.tools.stub.StubFile					
	13	org.acm.seguin.uml.refactor.ExtractMethodDialog	✓	✓	✓	✓	0.92
		org.acm.seguin.refactor.method.ExtractMethodRefactoring					
	14	org.acm.seguin.uml.refactor.ExtractMethodDialog	✓	✗	✗	✗	0.61
		org.acm.seguin.awt.OrderableList					
	15	org.acm.seguin.uml.refactor.MoveMethodDialog	✓	✗	✓	✓	0.84
		org.acm.seguin.uml.refactor.ParameterPanel					
	16	org.acm.seguin.uml.refactor.RenameClassDialog	✓	✓	✓	✓	0.99
		org.acm.seguin.summary.TypeSummary					
	17	org.acm.seguin.uml.refactor.RenameFieldDialog	✗	✓	✓	✓	0.88
		org.acm.seguin.summary.FieldSummary					
	18	org.acm.seguin.uml.refactor.RenameParameterDialog	✗	✓	✓	✓	0.93
		org.acm.seguin.summary.ParameterSummary					
	19	org.acm.seguin.uml.UMLPackage	✗	✓	✗	✓	0.82
		org.acm.seguin.uml.line.SegmentedLine					
	20	org.acm.seguin.uml.UMLPackage	✓	✓	✗	✗	0.76
		org.acm.seguin.summary.PackageSummary					
	21	org.acm.seguin.tools.stub.StubGenTraversal	✓	✗	✓	✗	0.67
		org.acm.seguin.tools.stub.StubFile					
Observer	1	org.acm.seguin.refactor.ComplexTransform	✗	✗	✗	✓	0.86
		org.acm.seguin.refactor.TransformAST					
	2	org.acm.seguin.summary.TypeSummary	✗	✗	✗	✓	0.91
		org.acm.seguin.metrics.TypeMetricsFrame					
	3	org.acm.seguin.summary.PackageSummary	✗	✗	✗	✓	0.88
		org.acm.seguin.uml.UMLPackage					
State/ Strategy	1	org.acm.seguin.print.xml.XMLLinePrinter	✗	✗	✗	✓	0.86
		org.acm.seguin.print.xml.State					
	2	org.acm.seguin.parser.ast.ASTNestedClassDeclaration	✗	✗	✗	✓	0.87
		org.acm.seguin.parser.JavaParserVisitor					
	3	org.acm.seguin.ide.common.action.RefactoringAction	✗	✗	✗	✗	0.51
		org.acm.seguin.ide.common.action.SelectedFileSet					

Table 3: on JRefractory2.6.24 (Cont.)

Design Pattern	#N	Class Name	SSA	DEMIMA	Sempatrec	GTM	Proposed Method
	4	org.acm.seguin.ide.common.SourceBrowserAdapter	×	×	×	✓	0.92
		org.acm.seguin.uml.Isourceful					
	5	org.acm.seguin.ide.elixir.version.ElixirVersionControlThread	×	×	×	✓	0.87
		org.acm.seguin.version.VersionControl					
	6	org.acm.seguin.parser.ast.ASTClassDeclaration	×	×	×	✓	0.78
		org.acm.seguin.parser.JavaParserVisitor					
	7	org.acm.seguin.parser.ast.ASTConstructorDeclaration	×	×	×	✓	0.86
		org.acm.seguin.parser.JavaParserVisitor					
	8	org.acm.seguin.parser.ast.ASTFieldDeclaration	×	×	×	✓	0.87
		org.acm.seguin.parser.JavaParserVisitor					
	9	org.acm.seguin.parser.ast.ASTInterfaceDeclaration	×	×	×	✓	0.76
		org.acm.seguin.parser.JavaParserVisitor					
	10	org.acm.seguin.parser.ast.ASTMethodDeclaration	×	×	×	✓	0.93
		org.acm.seguin.parser.JavaParserVisitor					
	11	org.acm.seguin.parser.ast.SimpleNode	×	×	×	✓	0.87
		org.acm.seguin.parser.JavaParserVisitor					
	12	org.acm.seguin.pretty.PrettyPrintVisitor	×	×	×	✓	0.84
		org.acm.seguin.parser.Node					
	13	org.acm.seguin.pretty.sort.MultipleOrdering	×	×	×	✓	0.8
		org.acm.seguin.pretty.sort.Ordering					
	14	org.acm.seguin.pretty.sort.MultipleOrdering	×	×	×	×	0.52
		org.acm.seguin.util.Settings					
	15	org.acm.seguin.refactor.AddImportTransform	×	×	×	✓	0.87
		org.acm.seguin.parser.Node					
	16	org.acm.seguin.refactor.ComplexTransform	×	×	×	✓	0.94
		org.acm.seguin.refactor.TransformAST					
	17	org.acm.seguin.refactor.field.RenameFieldData	×	×	×	✓	0.88
		org.acm.seguin.summary.Summary					
	18	org.acm.seguin.refactor.method.EMPParameterFinder	×	×	×	✓	0.93
		org.acm.seguin.parser.Node					
	19	org.acm.seguin.refactor.method.ExtractMethodRefactoring	×	×	×	✓	0.85
		org.acm.seguin.parser.Node					
	20	org.acm.seguin.refactor.method.MoveMethodRefactoring	×	×	×	✓	0.86
		org.acm.seguin.summary.Summary					
	21	org.acm.seguin.refactor.method.MoveMethodVisitor	×	×	×	✓	0.86
		org.acm.seguin.summary.Summary					
State/ Strategy	22	org.acm.seguin.summary.FrameworkFileSummaryLoader	×	×	×	✓	0.84
		org.acm.seguin.summary.load.LoadStatus					
	23	org.acm.seguin.summary.ImportSummary	×	×	×	✓	0.86
		org.acm.seguin.summary.SummaryVisitor					
	24	org.acm.seguin.summary.MethodSummary	×	×	×	✓	0.91
		org.acm.seguin.summary.SummaryVisitor					
	25	org.acm.seguin.summary.SummaryTraversal	×	×	×	✓	0.85
		org.acm.seguin.summary.load.LoadStatus					
	26	org.acm.seguin.summary.SummaryTraversal	×	×	×	✓	0.86
		org.acm.seguin.summary.FrameworkLoader					

Table 3: on JRefactory2.6.24 (Cont.)

Design Pattern	#N	Class Name	SSA	DEMIMA	Sempatrec	GTM	Proposed Method
	27	org.acm.seguin.summary.TypeSummary	×	×	×	✓	0.86
		org.acm.seguin.summary.SummaryVisitor					
	28	org.acm.seguin.summary.VariableSummary	×	×	×	✓	0.78
		org.acm.seguin.summary.SummaryVisitor					
	29	org.acm.seguin.uml.line.DragPanelAdapter	×	×	×	✓	0.89
		org.acm.seguin.uml.line.EndPointPanel					
	30	org.acm.seguin.uml.line.DragPanelAdapter	×	×	×	✓	0.84
		org.acm.seguin.uml.line.LinedPanel					
	31	org.acm.seguin.uml.line.LineMouseAdapter	×	×	×	✓	0.84
		org.acm.seguin.uml.line.LinedPanel					
	32	org.acm.seguin.uml.line.SegmentedLine	×	×	×	✓	0.88
		org.acm.seguin.uml.line.EndPointPanel					
	33	org.acm.seguin.uml.loader.ReloaderSingleton	×	×	×	✓	0.91
		org.acm.seguin.uml.loader.Reloader					

Table 4: On QuickUML 2001

Design Pattern	#N	Class Name	SSA	DEMIMA	Sempatrec	GTM	Proposed Method
Singleton	1	Singleton: uml.ui.IconManager Singleton getInstance(): IconManager	✓	✓	✓	✓	0.98
Factory Method	1	Creator: diagram.DefaultFigureEditor Concrete Creator: uml.diagram.AssociationLinkEditor Concrete Creator: uml.diagram.ClassEditor Concrete Creator: uml.diagram.CompositionLinkEditor Concrete Creator: uml.diagram.DependencyLinkEditor Concrete Creator: uml.diagram.GeneralizationLinkEditor Concrete Creator: uml.diagram.InterfaceEditor Concrete Creator: uml.diagram.NoteEditor Concrete Creator: uml.diagram.RealizationLinkEditor Creator factory Method: getCellEditorValue(): Object Product: Object	×	×	×	✓	0.84
	2	Creator: diagram.tool.LinkTool Concrete Creator: uml.ui.AssociationTool Concrete Creator: uml.ui.CompositionTool Concrete Creator: uml.ui.dependencyTool Concrete Creator: uml.ui.GeneralizationTool Concrete Creator: uml.ui.RealizationTool Creator factory Method: createLink(Figure source, Figure sink) Product: diagram.Link	✓	✓	✓	✓	0.98

Table 4: On QuickUML 2001 (Cont.)

Design Pattern	#N	Class Name	SSA	DEMIMA	Semparec	GTM	Proposed Method
Composite	1	Component: diagram.tool.Tool Composite: diagram.tool.CompositeTool Children of Composite: None Propagation Method: addToolListener(ToolListener l): None Propagation Method: removeToolListener(ToolListener l): None Propagation Method: install(Diagram diagram): None Propagation Method: uninstall(Diagram diagram): None leaves: None	×	×	×	×	0.52
	1	Subject: ClipboardTool Notify_Class_Name: ClipboardTool Subject_Method_Name: DoCopy Proagation Method: DoCopy (None/Add) Subject_Method_Name: DoCut Proagation Method: DoCut (None/GetConnected) Proagation Method: DoCut (None/Remove) Proagation Method: DoCut (None/DamageFigure) Proagation Method: DoCut (None/RefreshFigure) Subject_Method_Name: DoPaste Proagation Method: DoPaste (None/Size) Proagation Method: DoPaste (None/Get) Proagation Method: DoPaste (None/DamageFigure) Proagation Method: DoPaste (None/GetSink) Proagation Method: DoPaste (None/Indexof) Proagation Method: DoPaste (None/Clone) Proagation Method: DoPaste (None/Set) Proagation Method: DoPaste (None/GetSource) Proagation Method: DoPaste (None/Println) Proagation Method: DoPaste (None/Equals) Proagation Method: DoPaste (None/SetSource) Proagation Method: DoPaste (None/Clear) Proagation Method: DoPaste (None/RefreshFigure)	×	×	×	✓	0.86
Observer	2	Subject: CompositeTool Notify_Class_Name: CompositeTool Subject_Method_Name: AddToolListener Proagation Method: AddToolListener (None/Iterator) Proagation Method: AddToolListener (None/HasNext) Proagation Method: AddToolListener (None/AddToolListener) Proagation Method: AddToolListener (None/Next) Subject_Method_Name: RemoveToolListener Proagation Method: RemoveToolListener (None/Iterator) Proagation Method: RemoveToolListener (None/HasNext) Proagation Method: RemoveToolListener (None/RemoveToolListener) Proagation Method: RemoveToolListener (None/Next) Subject_Method_Name: Install Proagation Method: Install (None/Iterator)	×	×	×	✓	0.87

Table 4: On QuickUML 2001 (Cont.)

Design Pattern	#N	Class Name	SSA	DEMiMA	Sempatrec	GTM	Proposed Method
	3	Subject: FigureDraggingTool Notify_Class_Name: FigureDraggingTool Subject_Method_Name: MouseDragged Proagation Method: MouseDragged (None/isConsumed) Proagation Method: MouseDragged (None/Consume) Proagation Method: MouseDragged (None/GetPoint) Proagation Method: MouseDragged (None/Getx) Proagation Method: MouseDragged (None/Gety) Proagation Method: MouseDragged (None/Getui) Proagation Method: MouseDragged (None/DamageFigure) Proagation Method: MouseDragged (None/Translate) Proagation Method: MouseDragged (None/RefreshFigure) Subject_Method_Name: GetRelatedFigures Proagation Method: GetRelatedFigures (None/GetConnected) Proagation Method: GetRelatedFigures (None/Add) Proagation Method: GetRelatedFigures (None/toArray) Proagation Method: GetRelatedFigures (None/Clear)	✓	✓	✓	✓	1
Adaptor	1	Target: DefaultFigureEditor Adapter: diagram.DefaultLinkEditor Adaptee: DefaultLabelRenderrer Adapter Function: GetFigureEditorComponent() Adaptee Function: GetRendererComponent()	×	×	×	✓	0.85
	2	Target: DefaultFigureEditor Adapter: diagram.NoteEditor Adaptee: NoteComponent Adapter Function: GetCellEditorValue() Adaptee Function: GetText()	✓	✓	✓	✓	0.99
	3	Target: FigureEditor Adapter: diagram.DefaultLinkEditor Adaptee: DefaultLabelRenderrer Adapter Function: GetFigureEditorComponent() Adaptee Function: GetRendererComponent()	×	×	×	✓	0.83
Sate/ Strategy	1	Context: Diagram State/strategy: FigureRenderrer Concrete State/Strategy: DefaultFigureRenderrer,DefaultLabelRenderrer, DefaultLinkRenderrer,LinkLabel State/Strategy Field: Renderrer(GetDecoratedBounds)	✓	✓	×	✓	0.95

Table 5: On MapperXML v1.9.7

Design Pattern	#N	Class Name	SSA	DEMIMA	Sempatrec	GTM	Proposed Method
Singleton	1	Singleton: Debug Singleton_getInstance: getInstance():Debug	✓	✓	✓	✓	0.99
	2	Singleton: CodeGenerator Singleton_getInstance: getInstance():CodeGenerator	✗	✗	✗	✗	0.52
Factory Method	1	Creator: TextField Concrete Creator: HtmlAnchorUrl, HtmlInputText Creator factory Method: CreateDefaultRenderer() Product: TextFieldRenderer	✗	✓	✓	✓	0.88
	2	Creator: CheckBoxField Concrete Creator: HtmlCheckBox Creator factory Method: CreateDefaultRenderer() Product: CheckBoxFieldRenderer	✗	✗	✗	✓	0.82
	3	Creator: ComponentFactory Concrete Creator: HtmlComponentFactory Creator factory Method: CreateComponentForElement() Product: Component	✗	✓	✓	✓	0.93
	4	Creator: HtmlComponentFactory Concrete Creator: HtmlComponentFactoryTest, TestFactory Creator factory Method: CreateComponentForElement() Product: Component	✓	✗	✓	✓	0.92
	5	Creator: DefaultTextModel Concrete Creator: DefaultSelectModel Creator factory Method: CreateDefaultValueHolder() Product: ValueHolder	✗	✓	✗	✓	0.82
	6	Creator: Parameter Concrete Creator: CheckBoxField, SelectField Creator factory Method: CreateDefaultModel() Product: TextModel	✗	✓	✗	✓	0.76
	7	Creator: DocumentElement Concrete Creator: Form, Template Creator factory Method: CreateDefaultRenderer() Product: DocumentElementRenderer	✓	✓	✗	✗	0.76
	8	Creator: DispatchingContainer Concrete Creator: Template Creator factory Method: CreateInputDispatcher() Product: InputDispatcher Creator: DispatchingContainer	✗	✗	✓	✓	0.96
	9	Creator: DispatchingContainer Concrete Creator: Template Creator factory Method: CreateTriggerDispatcher() Product: TriggerDispatcher	✓	✗	✓	✗	0.67
Composite	1	Component: Component Composite: Container Children of Composite: HtmlComponentFactoryTest,DefaultMessageForm,ServletForm, DispatchingContainer, DocumentElement,Form,Template Propagation Method: Contains(),Get() leaves: None	✓	✓	✓	✓	1

Table 5: On MapperXML v1.9.7 (Cont.)

Design Pattern	#N	Class Name	SSA	DEMiMA	Sempatre	GTM	Proposed Method
Observer	1	Subject: abstractlistvalueholder notify_class_name: abstractlistvalueholder subject_method_name: firevaluechanged Proagation Method: firevaluechanged (None1/valuechanged) Proagation Method: firevaluechanged (None2/elementat)	×	×	×	✓	0.87
	2	Subject: abstractvalueholder notify_class_name: abstractvalueholder subject_method_name: firestatechanged Proagation Method: firestatechanged (None2/statechanged) Proagation Method: firestatechanged (None3/elementat)	✓	×	×	✓	0.91
	3	Subject: vovalueholder notify_class_name: vovalueholder subject_method_name: propertyChange Proagation Method: propertyChange (None5/fireStateChanged)	×	×	×	✓	0.88
	4	Subject: defaulttextmodel notify_class_name: defaulttextmodel subject_method_name: firestatechanged Proagation Method: firestatechanged (None4/statechanged) Proagation Method: firestatechanged (None5/elementat)	✓	×	×	✓	0.86
	5	Subject: mdocument notify_class_name: mdocument subject_method_name: fireenablechange Proagation Method: fireenablechange (None8/enablechange) Proagation Method: fireenablechange (None9/elementat)	×	×	×	×	0.56
	6	Subject: component notify_class_name: component subject_method_name: lazyaddnotify Proagation Method: lazyaddnotify (None10/hasnext) Proagation Method: lazyaddnotify (None11/getdispatcher) Proagation Method: lazyaddnotify (None11/next) Proagation Method: lazyaddnotify (None11/addnotify) subject_method_name: lazyremovenotify Proagation Method: lazyremovenotify (None11/hasnext) Proagation Method: lazyremovenotify (None11/getdispatcher) Proagation Method: lazyremovenotify (None11/next) Proagation Method: lazyremovenotify (None11/removenotify) subject_method_name: fireparameterreceived Proagation Method: fireparameterreceived (None11/hasnext) Proagation Method: fireparameterreceived (None11/parameterreceived) Proagation Method: fireparameterreceived (None11/next) subject_method_name: fireinputreceived Proagation Method: fireinputreceived (None11/hasnext) Proagation Method: fireinputreceived (None11/inputreceived) Proagation Method: fireinputreceived (None11/next) subject_method_name: firerender Proagation Method: firerender (None11/hasnext) Proagation Method: firerender (None11/render) Proagation Method: firerender (None11/next)	×	×	✓	✓	0.94

Table 5: On MapperXML v1.9.7 (Cont.)

Design Pattern	#N	Class Name	SSA	DEMiMA	Sempatrec	GTM	Proposed Method
	7	Subject: form notify_class_name: form subject_method_name: fireinitcontextreceived Proagation Method: fireinitcontextreceived (None14/hasnext) Proagation Method: fireinitcontextreceived (None15/initcontext) Proagation Method: fireinitcontextreceived (None15/next) subject_method_name: fireinitformreceived Proagation Method: fireinitformreceived (None15/hasnext) Proagation Method: fireinitformreceived (None15/initform) Proagation Method: fireinitformreceived (None15/next) subject_method_name: fireopenformreceived Proagation Method: fireopenformreceived (None15/hasnext) Proagation Method: fireopenformreceived (None15/openform) Proagation Method: fireopenformreceived (None15/next) subject_method_name: firecloseformreceived Proagation Method: firecloseformreceived (None15/hasnext) Proagation Method: firecloseformreceived (None15/closeform) Proagation Method: firecloseformreceived (None15/next)	✓	×	×	✓	0.9
	8	Subject: dispatcher notify_class_name: dispatcher subject_method_name: dispatch Proagation Method: dispatch (None13/hasnext) Proagation Method: dispatch (None14/next) Proagation Method: dispatch (None14/hasnext) Proagation Method: dispatch (None14/dispatchevent) Proagation Method: dispatch (None14/next)	×	×	×	×	0.68
Adaptor	1	Target: documentadapter Adapter: dom.dom_1_20000929_documentadapter Adaptee: abstractwriter (Adapter Function: write, Adaptee Function: write)	✓	×	✓	×	0.87
	2	Target: component Adapter: xml.button Adaptee: visiblerenderer (Adapter Function: processrenderevent, Adaptee Function: render)	×	×	×	✓	0.92
	3	Target: component, abstractfield Adapter: xml.checkboxfield Adaptee: checkboxfieldrenderrer (Adapter Function: processrenderevent, Adaptee Function: render)	×	×	×	✓	0.93
	4	Target: component Adapter: xml.dispatchingcontainer Adaptee: renderdispatcher (Adapter Function: processrenderevent, Adaptee Function: dispatch)	✓	✓	✓	✓	0.97

Table 5: On MapperXML v1.9.7 (Cont.)

Design Pattern	#N	Class Name	SSA	DEMIMA	Sempatre	GTM	Proposed Method
	5	Target: component Adapter: xml.dispatchingcontainer Adaptee: recycledispatcher (Adapter Function: processrecycleevent, Adaptee Function: dispatch)	✓	✓	✓	✓	1
	6	Target: component, abstractfield Adapter: xml.documentelement Adaptee: documentelementrenderer (Adapter Function: processrenderevent, Adaptee Function: render) (Adapter Function: processrecycleevent, Adaptee Function: recycle)	✓	✓	×	✓	0.95
	7	Target: component, abstractfield Adapter: xml.selectfield Adaptee: selectfieldrenderer (Adapter Function: processrenderevent, Adaptee Function: render)	✓	✓	×	✓	0.84
	8	Target: component, abstractfield Adapter: xml.textfield Adaptee: textfieldrenderer (Adapter Function: processrenderevent, Adaptee Function: render)	×	✓	✓	✓	0.88
State/ Strategy	1	Context: dom_1_20000929_documentadapter state: abstractwriter state_field: xmlwriter(write) concrete State: xmlwriter	×	✓	✓	✓	0.93
	2	Context: selectfield state: selectfieldrenderer state_field: renderer(render) concrete State: htmlselectfieldrenderer, attributeselectfieldrenderer	✓	✓	×	×	0.76
	3	Context: textfield state: textfieldrenderer state_field: renderer(render) concrete State: attributetextfieldrenderer	×	×	×	✓	0.87

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