Overview in General

This file contains a general overview of the data in the graph including node labels and relationships types.

References

- jqassistant
- Neo4j Python Driver

Node Labels

Table 1a - Highest node count by label combination

Lists the 30 label combinations with the highest number of nodes. The labels with the lowest node count are listed in table 1b. The total list would sum up to the total number of labels (100%).

The whole table can be found in the CSV report `Node_label_combination_count`.

```
Total number of nodes: 69426
```

	nodeLabels	nodesWithThatLabels	nodesWithThatLabelsPercent
0	[Java, ByteCode, Parameter]	11202	16.135165
1	[Java, ByteCode, Member, Method]	10687	15.393368
2	[File, Git, Log]	8142	11.727595
3	[Git, Commit, Log]	7776	11.200415
4	[Java, ByteCode, Bound, ParameterizedType]	6542	9.422983
5	[Java, ByteCode, Bound]	6316	9.097456
6	[Java, ByteCode, Member, Field]	2840	4.090686
7	[Java, ByteCode, Bound, WildcardType]	2723	3.922162
8	[Java, Value, ByteCode, Annotation]	2225	3.204851
9	[Java, ByteCode, Member, Method, Constructor]	1651	2.378072
10	[Xml, Element]	1534	2.209547
11	[Xml, Text]	1016	1.463429
12	[Java, ByteCode, Bound, TypeVariable]	989	1.424538
13	[Java, ByteCode, Member, Method, Lambda]	769	1.107654
14	[Type, File, Java, ByteCode, Class]	699	1.006827
15	[Type, File, Java, ByteCode, JavaType]	597	0.859908
16	[Type, File, Java, ByteCode, ResolvedDuplicate...	542	0.780687
17	[Java, GenericDeclaration, ByteCode, Member, M...	525	0.756201
18	[Java, Value, ByteCode, Primitive]	467	0.672659
19	[Git, Author, Log]	269	0.387463
20	[Type, File, Java, GenericDeclaration, ByteCod...	215	0.309682
21	[Type, File, Java, ByteCode, ExternalType]	194	0.279434
22	[Type, File, Java, ByteCode, Interface]	167	0.240544
23	[Java, ByteCode, Bound, GenericArrayType]	145	0.208855
24	[Java, Value, ByteCode, Enum]	142	0.204534
25	[Maven, Dependency]	116	0.167084
26	[Value, Property]	109	0.157002
27	[Package, File, Directory, Java]	107	0.154121
28	[Value, Array]	104	0.149800
29	[Value, ManifestEntry]	91	0.131075

Chart 1a - Highest node count by label combination

Values under 0.5% will be grouped into "others" to get a cleaner plot. The group "others" is then broken down in Chart 1b.

```
<Figure size 640x480 with 0 Axes>
```

Nodes per label combination (more than 0.5% overall)

Legend:
- ['Java', 'ByteCode', 'Parameter']
- ['Java', 'ByteCode', 'Member', 'Method']
- ['File', 'Git', 'Log']
- ['Git', 'Commit', 'Log']
- ['Java', 'ByteCode', 'Bound', 'ParameterizedType']
- ['Java', 'ByteCode', 'Bound']
- ['Java', 'ByteCode', 'Member', 'Field']
- ['Java', 'ByteCode', 'Bound', 'WildcardType']
- ['Java', 'Value', 'ByteCode', 'Annotation']
- others
- ['Java', 'ByteCode', 'Member', 'Method', 'Constructor']
- ['Xml', 'Element']
- ['Xml', 'Text']
- ['Java', 'ByteCode', 'Bound', 'TypeVariable']
- ['Java', 'ByteCode', 'Member', 'Method', 'Lambda']
- ['Type', 'File', 'Java', 'ByteCode', 'Class']
- ['Type', 'File', 'Java', 'ByteCode', 'JavaType']
- ['Type', 'File', 'Java', 'ByteCode', 'ResolvedDuplicateType']
- ['Java', 'GenericDeclaration', 'ByteCode', 'Member', 'Method']
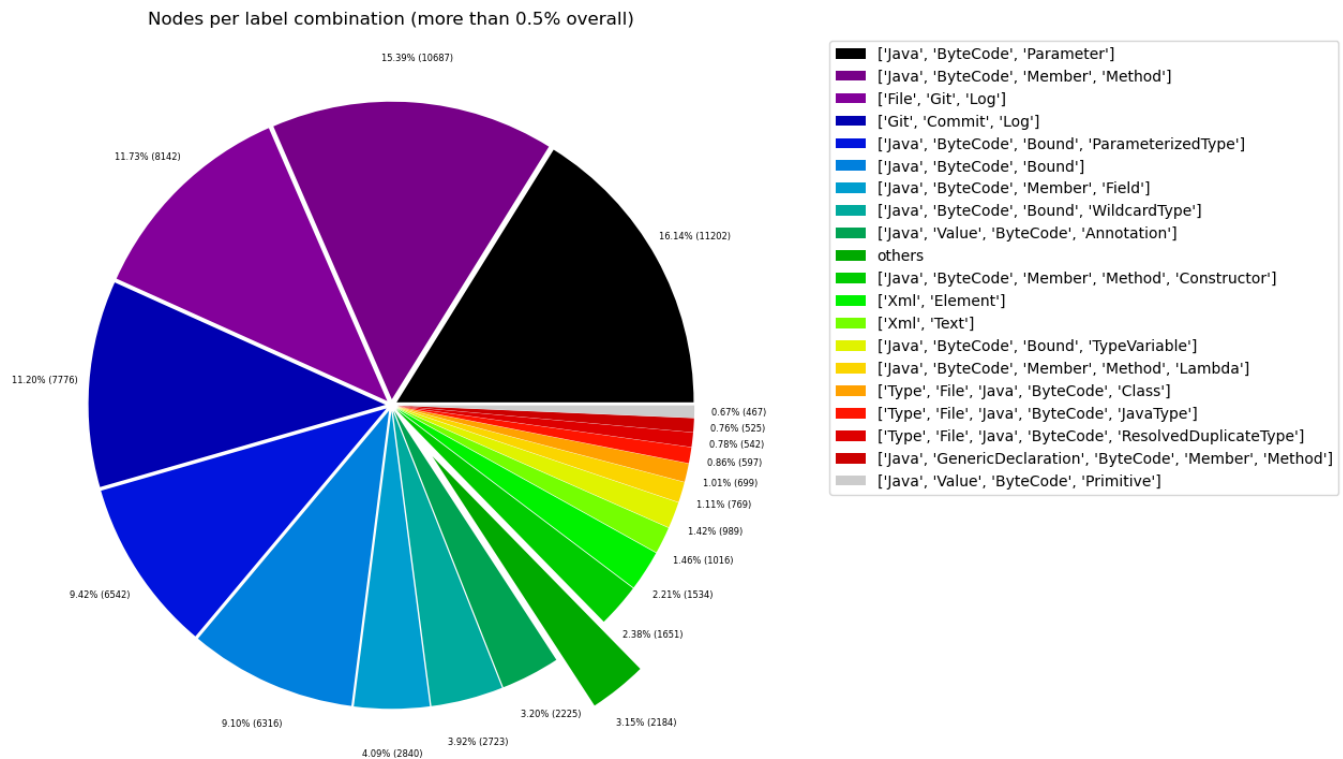- ['Java', 'Value', 'ByteCode', 'Primitive']

Table 1b - Lowest node count by label combination

Lists the 30 label combinations with the lowest number of nodes until they reach 0.5% of the total node count, which are shown above.

	nodeLabels	nodesWithThatLabels	nodesWithThatLabelsPercent
0	[Repository, Git]	1	0.001440
1	[Analyze, Task, jQAssistant]	1	0.001440
2	[Maven, Exclusion]	1	0.001440
3	[Java, GenericDeclaration, ByteCode, Member, M...	3	0.004321
4	[Type, File, Java, ByteCode, Void]	6	0.008642
5	[File, Maven, Xml, Pom, Document]	6	0.008642
6	[Java, ManifestSection]	6	0.008642
7	[File, Java, Manifest]	6	0.008642
8	[Artifact, File, Jar, Archive, Zip, Java]	6	0.008642
9	[File, Java, Properties]	8	0.011523
10	[File, Java, ServiceLoader]	9	0.012963
11	[Xml, Attribute]	12	0.017285
12	[Maven, ExecutionGoal]	14	0.020165
13	[Maven, PluginExecution]	14	0.020165
14	[Maven, Plugin]	16	0.023046
15	[Maven, Configuration]	16	0.023046
16	[jQAssistant, Rule, Concept]	19	0.027367
17	[Type, File, Java, ByteCode, PrimitiveType]	21	0.030248
18	[Xml, Namespace]	24	0.034569
19	[Type, File, Java, ByteCode, Enum]	25	0.036010
20	[Java, Value, ByteCode, Class]	28	0.040331
21	[File, Directory]	29	0.041771
22	[Type, File, Java, ByteCode, Annotation]	40	0.057615
23	[Type, File, Java, ByteCode, ExternalType, Ext...	65	0.093625
24	[Artifact, Maven]	69	0.099386
25	[Type, File, Java, GenericDeclaration, ByteCod...	80	0.115231
26	[Value, ManifestEntry]	91	0.131075
27	[Value, Array]	104	0.149800
28	[Package, File, Directory, Java]	107	0.154121
29	[Value, Property]	109	0.157002

Chart 1b - Lowest node count by label combination

Shows the lowest (less than 0.5% overall) node count label combinations. Therefore, this plot breaks down the "others" slice of the pie chart above. Values under 0.01% will be grouped into "others" to get a cleaner plot.

<Figure size 640x480 with 0 Axes>

Nodes per label combination (less than 0.5% overall)

Legend:
- ['Git', 'Author', 'Log']
- ['Type', 'File', 'Java', 'GenericDeclaration', 'ByteCode', 'Class']
- ['Type', 'File', 'Java', 'ByteCode', 'ExternalType']
- ['Type', 'File', 'Java', 'ByteCode', 'Interface']
- ['Java', 'ByteCode', 'Bound', 'GenericArrayType']
- ['Java', 'Value', 'ByteCode', 'Enum']
- ['Maven', 'Dependency']
- ['Value', 'Property']
- ['Package', 'File', 'Directory', 'Java']
- ['Value', 'Array']
- ['Value', 'ManifestEntry']
- ['Type', 'File', 'Java', 'GenericDeclaration', 'ByteCode', 'Interface']
- ['Artifact', 'Maven']
- ['Type', 'File', 'Java', 'ByteCode', 'ExternalType', 'ExternalAnnotation']
- ['Type', 'File', 'Java', 'ByteCode', 'Annotation']
- others
- ['File', 'Directory']
- ['Java', 'Value', 'ByteCode', 'Class']
- ['Type', 'File', 'Java', 'ByteCode', 'Enum']
- ['Xml', 'Namespace']
- ['Type', 'File', 'Java', 'ByteCode', 'PrimitiveType']
- ['jQAssistant', 'Rule', 'Concept']
- ['Maven', 'Plugin']
- ['Maven', 'Configuration']
- ['Maven', 'PluginExecution']
- ['Maven', 'ExecutionGoal']
- ['Xml', 'Attribute']
- ['File', 'Java', 'ServiceLoader']
- ['File', 'Java', 'Properties']

Table 1c - Highest node count by single label

Lists the 40 labels with the highest number of nodes. Doesn't sum up to the total number of nodes or 100% because one node can have multiple labels. Helps to identify commonly used labels.

	nodeLabel	nodesWithThatLabel	nodesWithThatLabelPercent
0	Java	50047	72.086826
1	ByteCode	49905	71.882292
2	Bound	16715	24.075995
3	Member	16475	23.730303
4	Git	16188	23.316913
5	Log	16187	23.315473
6	Method	13635	19.639616
7	Parameter	11202	16.135165
8	File	10964	15.792354
9	Commit	7776	11.200415
10	ParameterizedType	6542	9.422983
11	Value	3166	4.560251
12	Field	2840	4.090686
13	WildcardType	2723	3.922162
14	Type	2651	3.818454
15	Xml	2592	3.733472
16	Annotation	2265	3.262467
17	Constructor	1654	2.382393
18	Element	1534	2.209547
19	Text	1016	1.463429
20	TypeVariable	989	1.424538
21	Class	942	1.356840
22	GenericDeclaration	823	1.185435
23	Lambda	769	1.107654
24	JavaType	597	0.859908
25	ResolvedDuplicateType	542	0.780687
26	Primitive	467	0.672659
27	Author	269	0.387463
28	ExternalType	259	0.373059
29	Maven	252	0.362976
30	Interface	247	0.355774
31	Enum	167	0.240544
32	GenericArrayType	145	0.208855
33	Directory	136	0.195892
34	Dependency	116	0.167084
35	Property	109	0.157002
36	Package	107	0.154121
37	Array	104	0.149800
38	ManifestEntry	91	0.131075
39	Artifact	75	0.108029

Chart 1c - Highest node count by label

Shows the 40 labels with the highest number of nodes.

```
<Figure size 640x480 with 0 Axes>
```

Node count by label
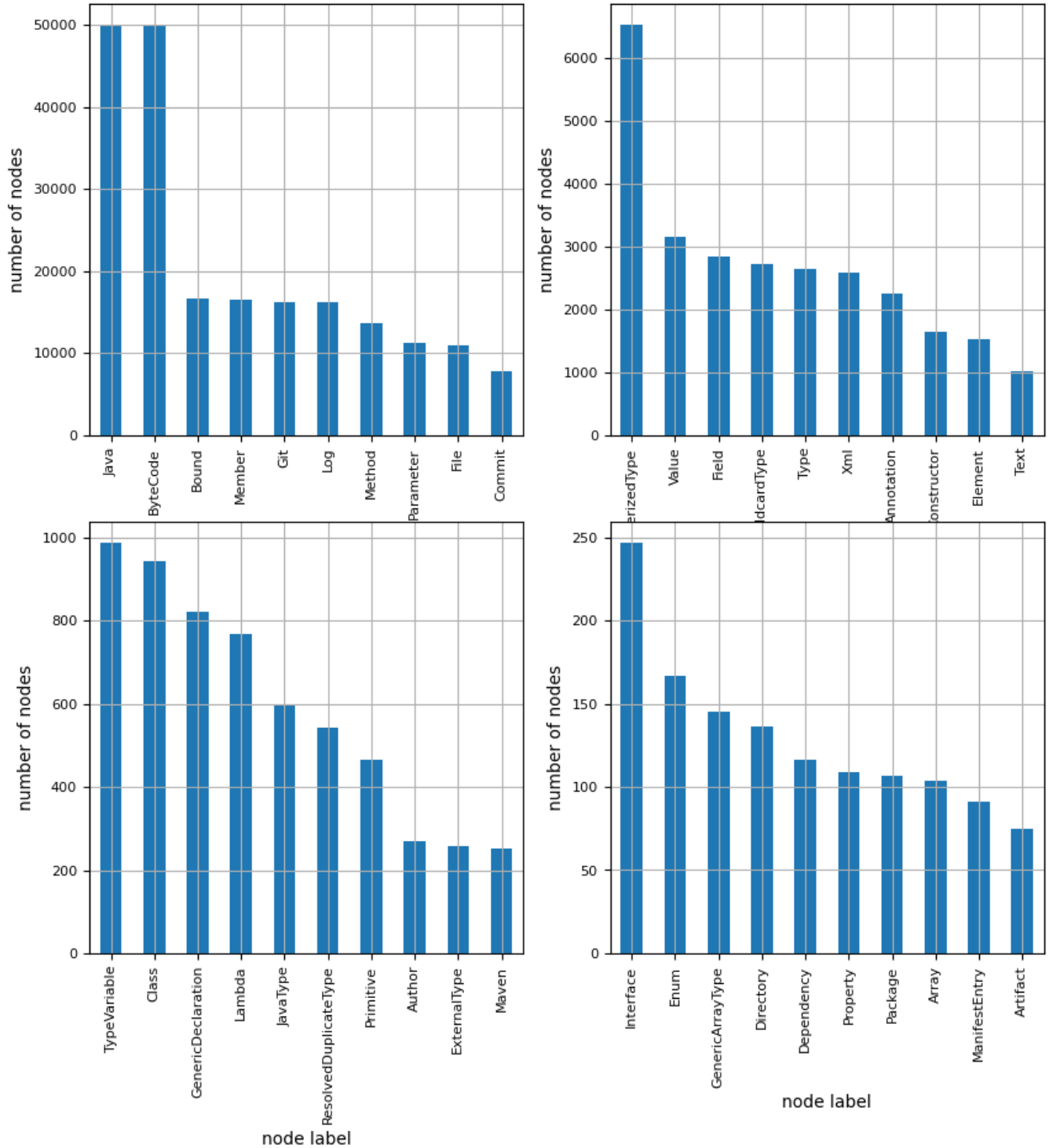
Relationship Types

Table 2a - Highest relationship count by type

Lists the 30 relationship types with the highest number of occurrences. The whole table can be found in the CSV report `Relationship_type_count` .

```
Total number of relationships: 249983
```

	relationshipType	nodesWithThatRelationshipType	nodesWithThatRelationshipTypePercent
0	CONTAINS_CHANGED	46599	18.640868
1	INVOKES	29998	12.000016
2	OF_TYPE	17636	7.054880
3	DEPENDS_ON	17445	6.978475
4	DECLARES	16837	6.735258
5	OF_RAW_TYPE	15200	6.080413
6	HAS	11902	4.761124
7	RETURNS	10643	4.257490
8	HAS_FILE	8142	3.257021
9	AUTHORED	7776	3.110612
10	HAS_COMMIT	7776	3.110612
11	READS	7695	3.078209
12	HAS_ACTUAL_TYPE_ARGUMENT	7501	3.000604
13	HAS_PARENT	6288	2.515371
14	OF_GENERIC_TYPE	5349	2.139746
15	SIMILAR	3419	1.367693
16	RETURNS_GENERIC	3253	1.301288
17	WRITES	3066	1.226483
18	CONTAINS	3031	1.212482
19	RESOLVES_TO	2954	1.181680
20	ANNOTATED_BY	2213	0.885260
21	HAS_FIRST_CHILD	1534	0.613642
22	HAS_LAST_CHILD	1534	0.613642
23	HAS_ELEMENT	1522	0.608841
24	REQUIRES	1425	0.570039
25	HAS_UPPER_BOUND	1406	0.562438
26	EXTENDS	1269	0.507635
27	HAS_TEXT	1016	0.406428
28	HAS_SIBLING	1004	0.401627
29	DECLARES_TYPE_PARAMETER	972	0.388826

Chart 2a - Highest relationship count by type

Values under 0.5% will be grouped into "others" to get a cleaner plot. The group "others" is then broken down in the second chart.
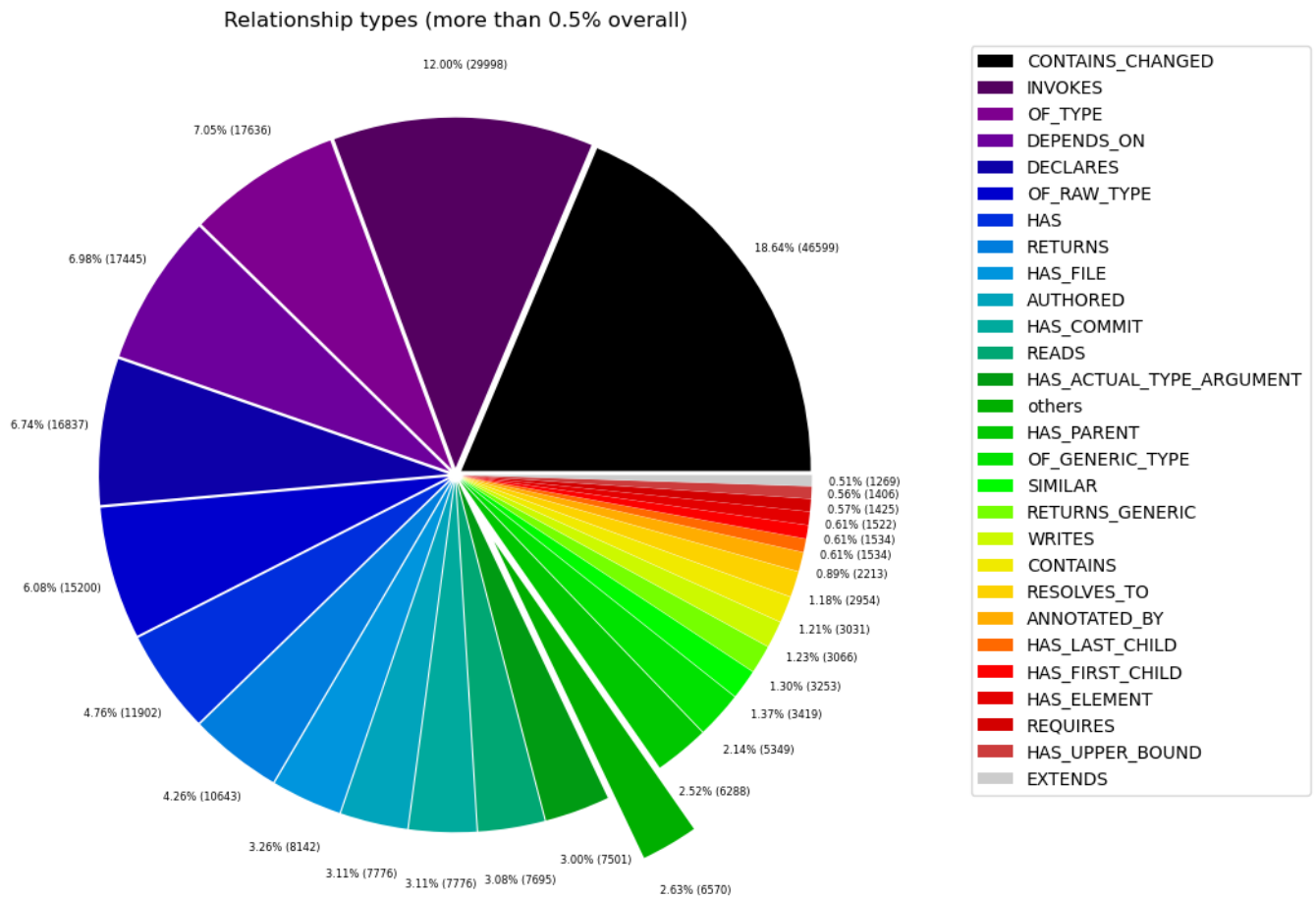
```
<Figure size 640x480 with 0 Axes>
```

12.00% (29998)

7.05% (17636)

6.98% (17445)

6.74% (16837)

6.08% (15200)

4.76% (11902)

4.26% (10643)

3.26% (8142)

3.11% (7776)   3.11% (7776)   3.08% (7695)

3.00% (7501)

2.63% (6570)

2.52% (6288)

2.14% (5349)

1.37% (3419)

1.30% (3253)

1.23% (3066)

1.21% (3031)

1.18% (2954)

0.89% (2213)

0.61% (1534)

0.61% (1534)

0.61% (1522)

0.57% (1425)

0.56% (1406)

0.51% (1269)

18.64% (46599)

Legend:
- CONTAINS_CHANGED
- INVOKES
- OF_TYPE
- DEPENDS_ON
- DECLARES
- OF_RAW_TYPE
- HAS
- RETURNS
- HAS_FILE
- AUTHORED
- HAS_COMMIT
- READS
- HAS_ACTUAL_TYPE_ARGUMENT
- others
- HAS_PARENT
- OF_GENERIC_TYPE
- SIMILAR
- RETURNS_GENERIC
- WRITES
- CONTAINS
- RESOLVES_TO
- ANNOTATED_BY
- HAS_LAST_CHILD
- HAS_FIRST_CHILD
- HAS_ELEMENT
- REQUIRES
- HAS_UPPER_BOUND
- EXTENDS

Table 2b - Lowest relationship count by type

Lists the 30 relationships type with the lowest number of occurrences up to 0.5% of the total node count. This is essentially breaking down the "others" slice from the chart above.

	relationshipType	nodesWithThatRelationshipType	nodesWithThatRelationshipTypePercent
0	EXCLUDES	1	0.000400
1	THROWS_GENERIC	5	0.002000
2	DESCRIBES	6	0.002400
3	HAS_ROOT_ELEMENT	8	0.003200
4	OF_NAMESPACE	12	0.004800
5	HAS_ATTRIBUTE	12	0.004800
6	HAS_GOAL	14	0.005600
7	HAS_EXECUTION	14	0.005600
8	USES_PLUGIN	16	0.006400
9	IS_ARTIFACT	16	0.006400
10	HAS_CONFIGURATION	16	0.006400
11	REQUIRES_TYPE_PARAMETER	17	0.006800
12	INCLUDES_CONCEPT	19	0.007601
13	DECLARES_NAMESPACE	24	0.009601
14	REQUIRES_CONCEPT	28	0.011201
15	HAS_DEFAULT	34	0.013601
16	TO_ARTIFACT	116	0.046403
17	DECLARES_DEPENDENCY	116	0.046403
18	HAS_COMPONENT_TYPE	145	0.058004
19	IS	171	0.068405
20	HAS_AUTHOR	269	0.107607
21	IMPLEMENTS_GENERIC	325	0.130009
22	HAS_LOWER_BOUND	402	0.160811
23	EXTENDS_GENERIC	450	0.180012
24	THROWS	634	0.253617
25	IMPLEMENTS	708	0.283219
26	DECLARES_TYPE_PARAMETER	972	0.388826
27	HAS_SIBLING	1004	0.401627
28	HAS_TEXT	1016	0.406428

Chart 2b - Lowest relationship count by type

Shows the lowest (less than 0.5% overall) relationship types. This plot breaks down the "others" slice of the pie chart above. Values under 0.01% will be grouped into "others" to get a cleaner plot.

```
<Figure size 640x480 with 0 Axes>
```

Relationship types (less than 0.5% overall)

Legend:
- HAS_TEXT
- HAS_SIBLING
- DECLARES_TYPE_PARAMETER
- IMPLEMENTS
- THROWS
- EXTENDS_GENERIC
- HAS_LOWER_BOUND
- IMPLEMENTS_GENERIC
- HAS_AUTHOR
- others
- IS
- HAS_COMPONENT_TYPE
- DECLARES_DEPENDENCY
- TO_ARTIFACT
- HAS_DEFAULT
- REQUIRES_CONCEPT

Pie chart values:
- 15.46% (38658)
- 15.28% (38201)
- 14.79% (36984)
- 10.78% (26939)
- 9.65% (24123)
- 6.85% (17122)
- 6.12% (15296)
- 4.95% (12366)
- 4.09% (10235)
- 2.74% (6849)
- 2.60% (6506)
- 2.21% (5517)
- 1.77% (4414)
- 1.77% (4414)
- 0.52% (1294)
- 0.43% (1065)
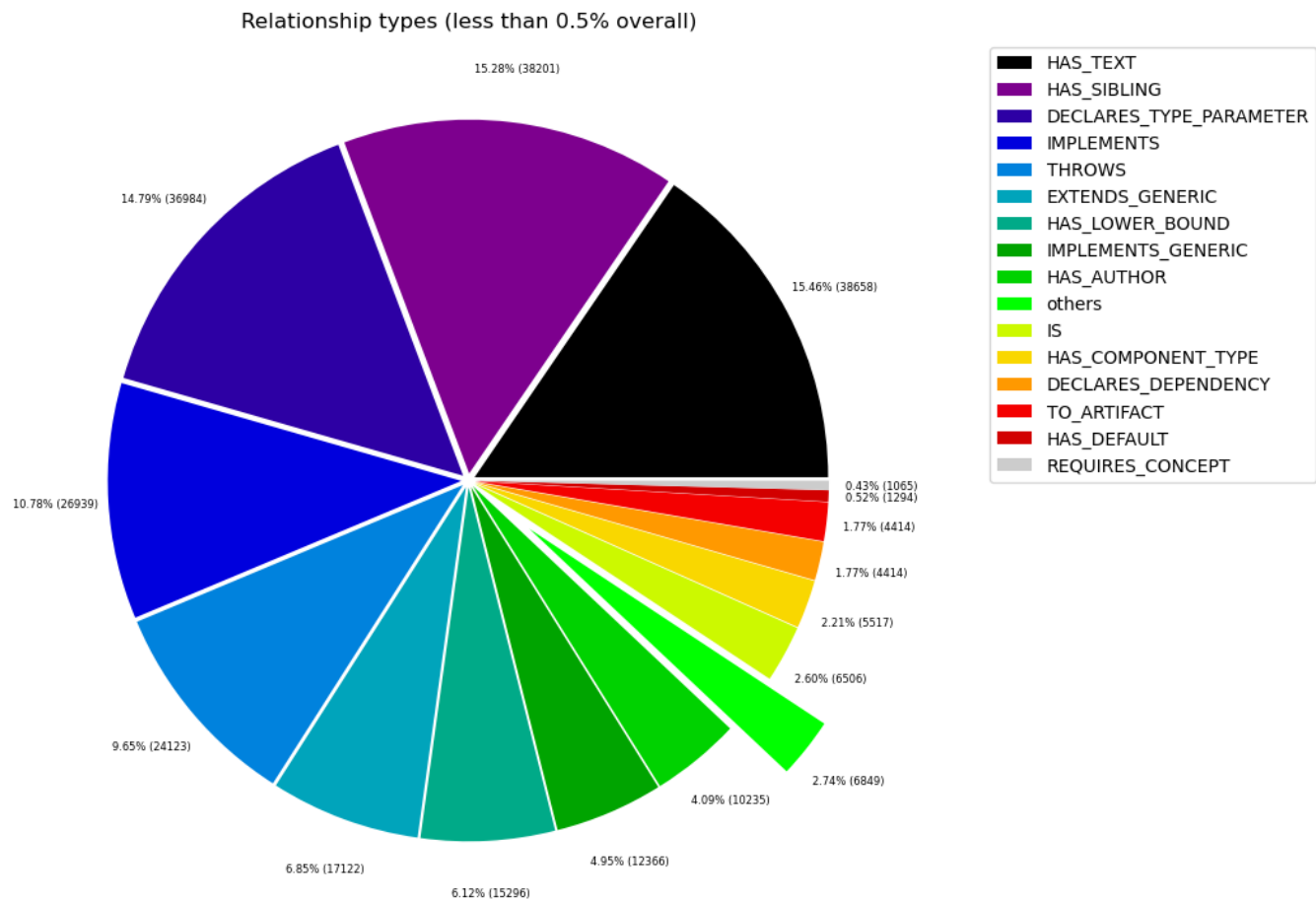
Node labels with their relationships

Table 3a - Highest relationship count by node labels and relationship type

Lists the 30 node labels and their relationship types with the highest number of occurrences.

	sourceLabels	relationType	targetLabels	numberOfRelationships	numberOfNodesWithSameLabelsAsSource	numberOfNodesWithS
0	[Git, Commit, Log]	CONTAINS_CHANGED	[File, Git, Log]	46599	7776	
1	[Java, ByteCode, Member, Method]	INVOKES	[Java, ByteCode, Member, Method]	18573	10600	
2	[Repository, Git]	HAS_FILE	[File, Git, Log]	8142	1	
3	[Repository, Git]	HAS_COMMIT	[Git, Commit, Log]	7776	1	
4	[Git, Author, Log]	AUTHORED	[Git, Commit, Log]	7776	269	
5	[Java, ByteCode, Member, Method]	HAS	[Java, ByteCode, Parameter]	7316	10600	
6	[Java, ByteCode, Member, Method]	READS	[Java, ByteCode, Member, Field]	6942	10600	
7	[Git, Commit, Log]	HAS_PARENT	[Git, Commit, Log]	6282	7776	
8	[Java, ByteCode, Parameter]	OF_TYPE	[Type, File, Java, ByteCode, JavaType]	5730	11202	
9	[Java, ByteCode, Bound]	OF_RAW_TYPE	[Type, File, Java, ByteCode, JavaType]	3218	6316	
10	[Java, ByteCode, Bound, ParameterizedType]	OF_RAW_TYPE	[Type, File, Java, ByteCode, JavaType]	2779	6542	
11	[Java, ByteCode, Bound, ParameterizedType]	HAS_ACTUAL_TYPE_ARGUMENT	[Java, ByteCode, Bound, WildcardType]	2723	6542	
12	[Java, ByteCode, Parameter]	OF_GENERIC_TYPE	[Java, ByteCode, Bound, ParameterizedType]	2435	11202	
13	[Java, ByteCode, Bound, ParameterizedType]	HAS_ACTUAL_TYPE_ARGUMENT	[Java, ByteCode, Bound, TypeVariable]	2230	6542	
14	[Java, ByteCode, Member, Method, Constructor]	WRITES	[Java, ByteCode, Member, Field]	1971	1651	
15	[Java, ByteCode, Member, Method]	RETURNS	[Type, File, Java, ByteCode, JavaType]	1891	10600	
16	[Java, Value, ByteCode, Annotation]	OF_TYPE	[Type, File, Java, ByteCode, ExternalType, Ext...]	1842	2225	
17	[Java, ByteCode, Parameter]	OF_GENERIC_TYPE	[Java, ByteCode, Bound]	1819	11202	
18	[Java, ByteCode, Member, Method, Constructor]	INVOKES	[Java, ByteCode, Member, Method, Constructor]	1744	1651	
19	[Java, ByteCode, Member, Method]	INVOKES	[Java, ByteCode, Member, Method, Constructor]	1716	10600	
20	[Java, ByteCode, Member, Method, Constructor]	HAS	[Java, ByteCode, Parameter]	1710	1651	
21	[Java, ByteCode, Parameter]	ANNOTATED_BY	[Java, Value, ByteCode, Annotation]	1594	11202	
22	[Java, ByteCode, Member, Method, Lambda]	INVOKES	[Java, ByteCode, Member, Method]	1565	769	
23	[Java, ByteCode, Member, Method, Constructor]	INVOKES	[Java, ByteCode, Member, Method]	1542	1651	
24	[Java, ByteCode, Bound, ParameterizedType]	HAS_ACTUAL_TYPE_ARGUMENT	[Java, ByteCode, Bound]	1530	6542	
25	[Xml, Element]	HAS_ELEMENT	[Xml, Element]	1522	1534	
26	[Java, ByteCode, Member, Method]	RETURNS	[Type, File, Java, ByteCode, Void]	1467	10600	
27	[Java, GenericDeclaration, ByteCode, Member, M...]	INVOKES	[Java, ByteCode, Member, Method]	1297	511	
28	[Type, File, Java, ByteCode, JavaType]	DECLARES	[Java, ByteCode, Member, Method]	1279	597	
29	[Java, ByteCode, Member, Method, Constructor]	RETURNS	[Type, File, Java, ByteCode, Void]	1221	1651	

Graph Density

```
total_number_of_nodes (vertices): 69426
total_number_of_relationships (edges): 249983
-> total directed graph density: 5.1864768440582084e-05
-> total directed graph density in percent: 0.0051864768440582085
```