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: 68826
```

	nodeLabels	nodesWithThatLabels	nodesWithThatLabelsPercent
0	[Java, ByteCode, Parameter]	11184	16.249673
1	[Java, ByteCode, Member, Method]	10629	15.443292
2	[File, Git, Log]	7804	11.338738
3	[Git, Commit, Log]	7618	11.068492
4	[Java, ByteCode, Bound, ParameterizedType]	6537	9.497864
5	[Java, ByteCode, Bound]	6308	9.165141
6	[Java, ByteCode, Member, Field]	2846	4.135065
7	[Java, ByteCode, Bound, WildcardType]	2722	3.954901
8	[Java, Value, ByteCode, Annotation]	2225	3.232790
9	[Java, ByteCode, Member, Constructor, Method]	1647	2.392991
10	[Xml, Element]	1534	2.228809
11	[Xml, Text]	1016	1.476186
12	[Java, ByteCode, Bound, TypeVariable]	988	1.435504
13	[Java, ByteCode, Member, Method, Lambda]	767	1.114404
14	[Type, File, Java, ByteCode, Class]	699	1.015605
15	[Type, File, Java, ByteCode, JavaType]	596	0.865952
16	[Type, File, Java, ByteCode, ResolvedDuplicate...	542	0.787493
17	[Java, ByteCode, GenericDeclaration, Member, M...	525	0.762793
18	[Java, Value, ByteCode, Primitive]	467	0.678523
19	[Git, Author, Log]	260	0.377764
20	[Type, File, Java, ByteCode, Class, GenericDec...	215	0.312382
21	[Type, File, Java, ByteCode, ExternalType]	194	0.281870
22	[Type, File, Java, ByteCode, Interface]	166	0.241188
23	[Java, ByteCode, Bound, GenericArrayType]	144	0.209223
24	[Java, Value, ByteCode, Enum]	142	0.206317
25	[Maven, Dependency]	116	0.168541
26	[Value, Property]	109	0.158370
27	[Package, File, Directory, Java]	107	0.155465
28	[Value, Array]	104	0.151106
29	[Value, ManifestEntry]	91	0.132217

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', 'Constructor', 'Method']
- ['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', 'ByteCode', 'GenericDeclaration', 'Member', 'Method']
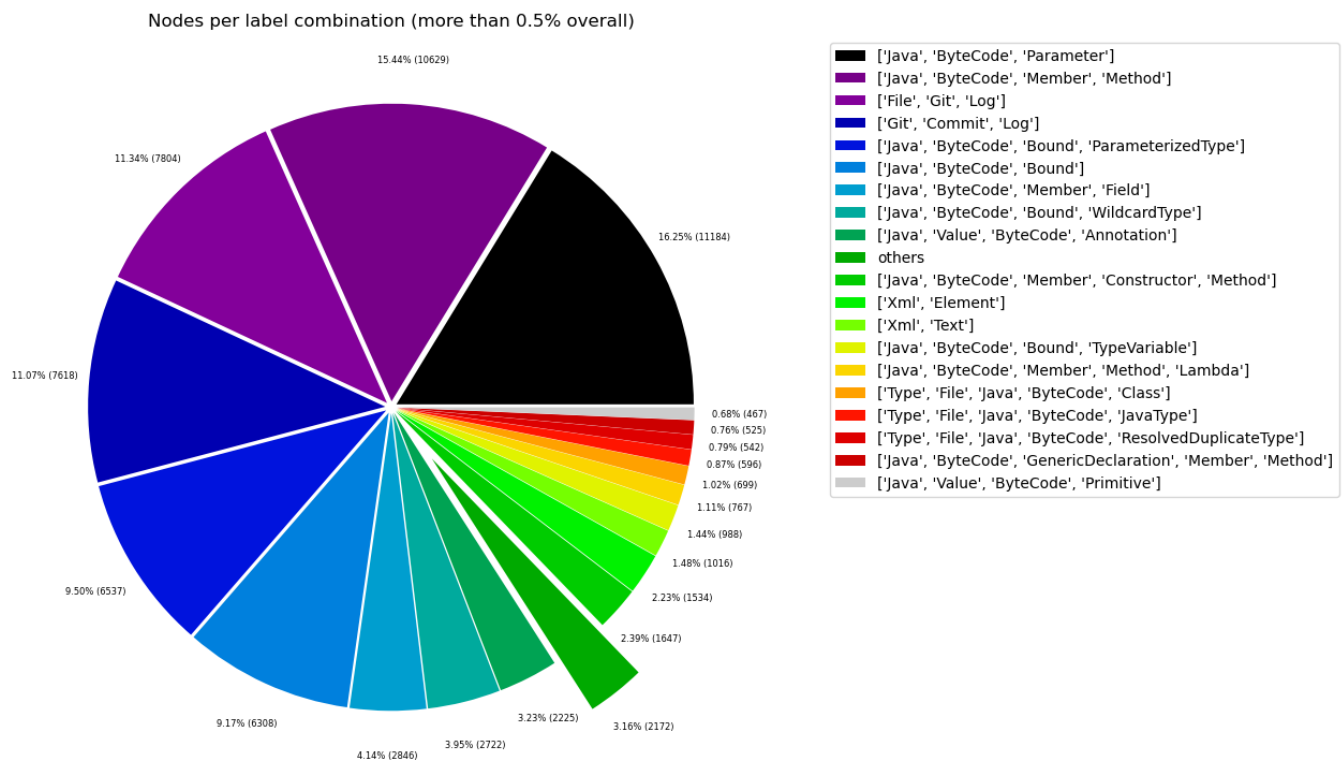- ['Java', 'Value', 'ByteCode', 'Primitive']

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	0.001453
1	[Analyze, Task, jQAssistant]	1	0.001453
2	[Maven, Exclusion]	1	0.001453
3	[Java, ByteCode, GenericDeclaration, Member, C...	3	0.004359
4	[Type, File, Java, ByteCode, Void]	6	0.008718
5	[File, Maven, Xml, Pom, Document]	6	0.008718
6	[Java, ManifestSection]	6	0.008718
7	[File, Java, Manifest]	6	0.008718
8	[Artifact, File, Jar, Archive, Zip, Java]	6	0.008718
9	[File, Java, Properties]	8	0.011624
10	[File, Java, ServiceLoader]	9	0.013076
11	[Xml, Attribute]	12	0.017435
12	[Maven, ExecutionGoal]	14	0.020341
13	[Maven, PluginExecution]	14	0.020341
14	[Maven, Plugin]	16	0.023247
15	[Maven, Configuration]	16	0.023247
16	[jQAssistant, Rule, Concept]	19	0.027606
17	[Type, File, Java, ByteCode, PrimitiveType]	21	0.030512
18	[Xml, Namespace]	24	0.034871
19	[Type, File, Java, ByteCode, Enum]	25	0.036323
20	[Java, Value, ByteCode, Class]	28	0.040682
21	[File, Directory]	29	0.042135
22	[Type, File, Java, ByteCode, Annotation]	40	0.058118
23	[Type, File, Java, ByteCode, ExternalAnnotatio...	65	0.094441
24	[Artifact, Maven]	69	0.100253
25	[Type, File, Java, ByteCode, GenericDeclaratio...	79	0.114782
26	[Value, ManifestEntry]	91	0.132217
27	[Value, Array]	104	0.151106
28	[Package, File, Directory, Java]	107	0.155465
29	[Value, Property]	109	0.158370

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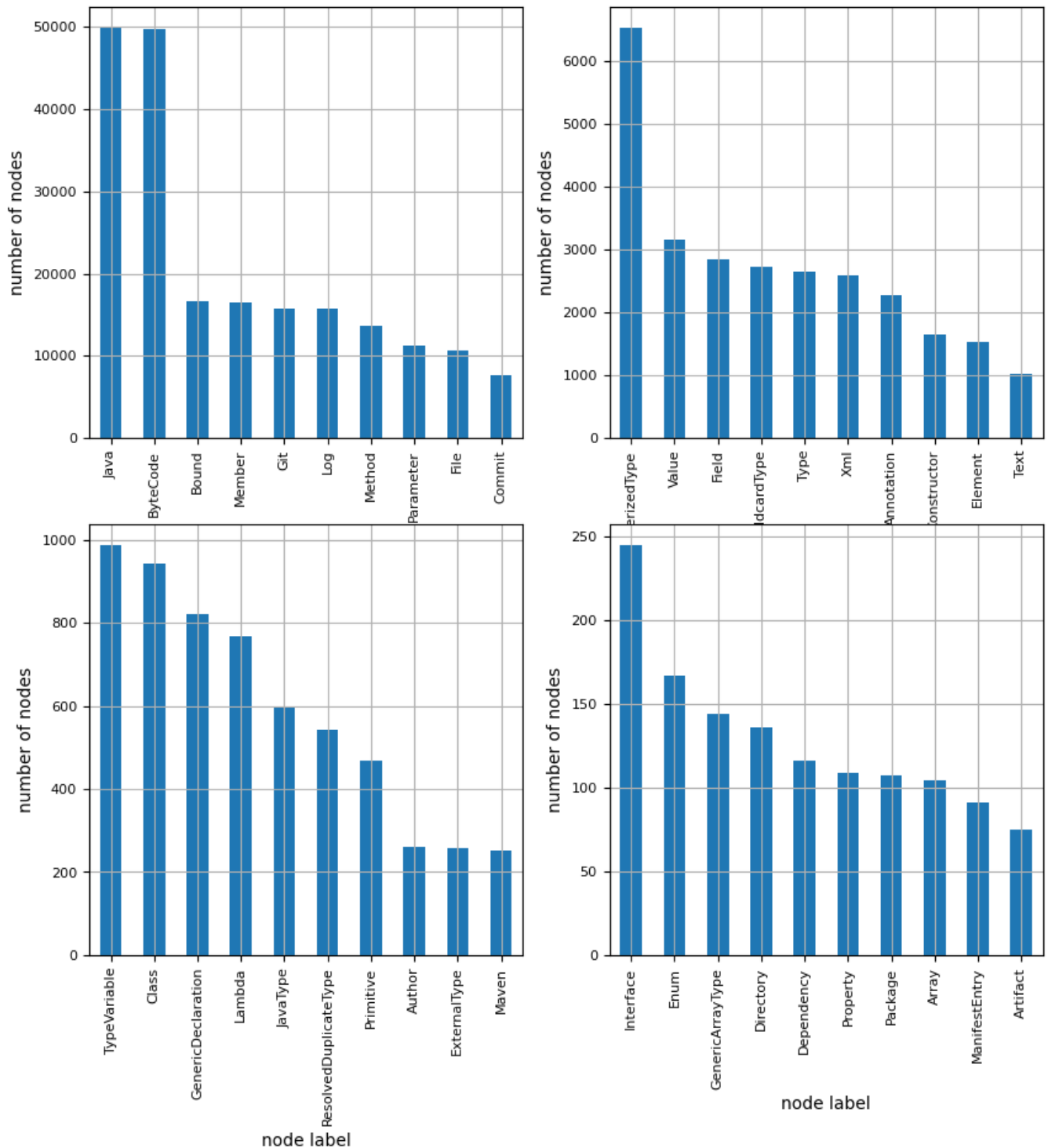
```
<Figure size 640x480 with 0 Axes>
```

Nodes per label combination (less than 0.5% overall)

	Label combination
■	['Git', 'Author', 'Log']
■	['Type', 'File', 'Java', 'ByteCode', 'Class', 'GenericDeclaration']
■	['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', 'ByteCode', 'GenericDeclaration', 'Interface']
■	['Artifact', 'Maven']
■	['Type', 'File', 'Java', 'ByteCode', 'ExternalAnnotation', 'ExternalType']
■	['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	49952	72.577224
1	ByteCode	49810	72.370906
2	Bound	16699	24.262633
3	Member	16417	23.852904
4	Git	15683	22.786447
5	Log	15682	22.784994
6	Method	13571	19.717839
7	Parameter	11184	16.249673
8	File	10623	15.434574
9	Commit	7618	11.068492
10	ParameterizedType	6537	9.497864
11	Value	3166	4.600006
12	Field	2846	4.135065
13	WildcardType	2722	3.954901
14	Type	2648	3.847383
15	Xml	2592	3.766019
16	Annotation	2265	3.290908
17	Constructor	1650	2.397350
18	Element	1534	2.228809
19	Text	1016	1.476186
20	TypeVariable	988	1.435504
21	Class	942	1.368669
22	GenericDeclaration	822	1.194316
23	Lambda	767	1.114404
24	JavaType	596	0.865952
25	ResolvedDuplicateType	542	0.787493
26	Primitive	467	0.678523
27	Author	260	0.377764
28	ExternalType	259	0.376311
29	Maven	252	0.366141
30	Interface	245	0.355970
31	Enum	167	0.242641
32	GenericArrayType	144	0.209223
33	Directory	136	0.197600
34	Dependency	116	0.168541
35	Property	109	0.158370
36	Package	107	0.155465
37	Array	104	0.151106
38	ManifestEntry	91	0.132217
39	Artifact	75	0.108970

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: 247789
```

	relationshipType	nodesWithThatRelationshipType	nodesWithThatRelationshipTypePercent
0	CONTAINS_CHANGED	45786	18.477818
1	INVOKES	29635	11.959772
2	OF_TYPE	17618	7.110082
3	DEPENDS_ON	17426	7.032596
4	DECLARES	16779	6.771487
5	OF_RAW_TYPE	15183	6.127391
6	HAS	11884	4.796016
7	RETURNS	10623	4.287115
8	HAS_FILE	7804	3.149454
9	READS	7684	3.101025
10	AUTHORED	7618	3.074390
11	HAS_COMMIT	7618	3.074390
12	HAS_ACTUAL_TYPE_ARGUMENT	7495	3.024751
13	HAS_PARENT	6162	2.486793
14	OF_GENERIC_TYPE	5346	2.157481
15	SIMILAR	3416	1.378592
16	RETURNS_GENERIC	3250	1.311600
17	WRITES	3065	1.236939
18	CONTAINS	3027	1.221604
19	RESOLVES_TO	2917	1.177211
20	ANNOTATED_BY	2213	0.893099
21	HAS_FIRST_CHILD	1534	0.619075
22	HAS_LAST_CHILD	1534	0.619075
23	HAS_ELEMENT	1522	0.614232
24	REQUIRES	1424	0.574682
25	HAS_UPPER_BOUND	1405	0.567015
26	EXTENDS	1267	0.511322
27	HAS_TEXT	1016	0.410026
28	HAS_SIBLING	1004	0.405183
29	DECLARES_TYPE_PARAMETER	971	0.391866

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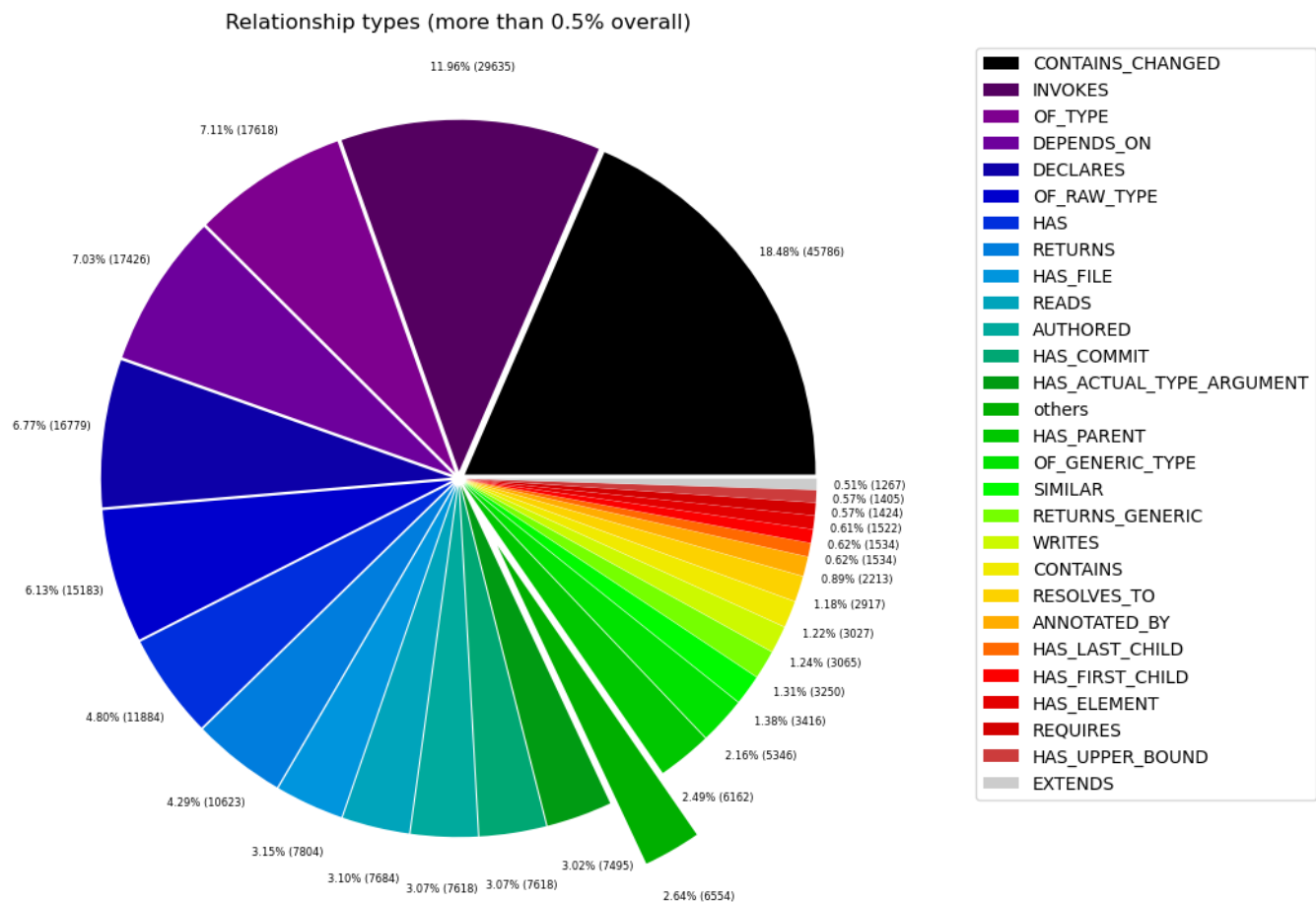
```
<Figure size 640x480 with 0 Axes>
```

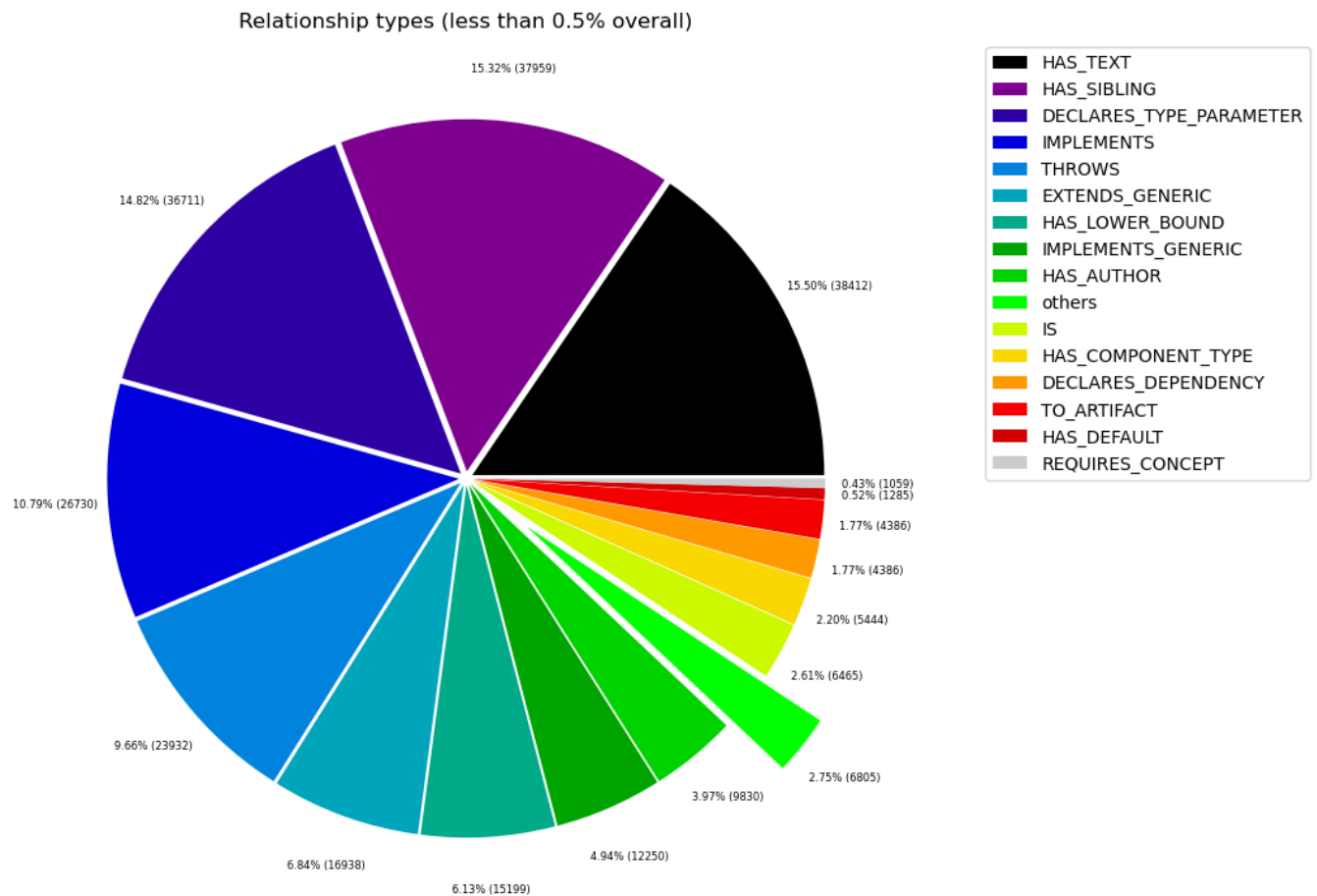Relationship types (more than 0.5% overall)

11.96% (29635)

7.11% (17618)

7.03% (17426)

6.77% (16779)

6.13% (15183)

4.80% (11884)

4.29% (10623)

3.15% (7804)

3.10% (7684)   3.07% (7618)   3.07% (7618)

2.64% (6554)

3.02% (7495)

2.49% (6162)

2.16% (5346)

1.38% (3416)

1.31% (3250)

1.24% (3065)

1.22% (3027)

1.18% (2917)

0.89% (2213)

0.62% (1534)

0.62% (1534)

0.61% (1522)

0.57% (1424)

0.57% (1405)

0.51% (1267)

18.48% (45786)

Legend:
- CONTAINS_CHANGED
- INVOKES
- OF_TYPE
- DEPENDS_ON
- DECLARES
- OF_RAW_TYPE
- HAS
- RETURNS
- HAS_FILE
- READS
- AUTHORED
- HAS_COMMIT
- 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	0.000404
1	THROWS_GENERIC	5	0.002018
2	DESCRIBES	6	0.002421
3	HAS_ROOT_ELEMENT	8	0.003229
4	OF_NAMESPACE	12	0.004843
5	HAS_ATTRIBUTE	12	0.004843
6	HAS_GOAL	14	0.005650
7	HAS_EXECUTION	14	0.005650
8	USES_PLUGIN	16	0.006457
9	IS_ARTIFACT	16	0.006457
10	HAS_CONFIGURATION	16	0.006457
11	REQUIRES_TYPE_PARAMETER	17	0.006861
12	INCLUDES_CONCEPT	19	0.007668
13	DECLARES_NAMESPACE	24	0.009686
14	REQUIRES_CONCEPT	28	0.011300
15	HAS_DEFAULT	34	0.013721
16	TO_ARTIFACT	116	0.046814
17	DECLARES_DEPENDENCY	116	0.046814
18	HAS_COMPONENT_TYPE	144	0.058114
19	IS	171	0.069010
20	HAS_AUTHOR	260	0.104928
21	IMPLEMENTS_GENERIC	324	0.130756
22	HAS_LOWER_BOUND	402	0.162235
23	EXTENDS_GENERIC	448	0.180799
24	THROWS	633	0.255459
25	IMPLEMENTS	707	0.285323
26	DECLARES_TYPE_PARAMETER	971	0.391866
27	HAS_SIBLING	1004	0.405183
28	HAS_TEXT	1016	0.410026

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:
- 15.50% (38412)
- 15.32% (37959)
- 14.82% (36711)
- 10.79% (26730)
- 9.66% (23932)
- 6.84% (16938)
- 6.13% (15199)
- 4.94% (12250)
- 3.97% (9830)
- 2.75% (6805)
- 2.61% (6465)
- 2.20% (5444)
- 1.77% (4386)
- 1.77% (4386)
- 0.52% (1285)
- 0.43% (1059)

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]	45786	7618	
1	[Java, ByteCode, Member, Method]	INVOKES	[Java, ByteCode, Member, Method]	18188	10549	
2	[Repository, Git]	HAS_FILE	[File, Git, Log]	7804	1	
3	[Repository, Git]	HAS_COMMIT	[Git, Commit, Log]	7618	1	
4	[Git, Author, Log]	AUTHORED	[Git, Commit, Log]	7618	260	
5	[Java, ByteCode, Member, Method]	HAS	[Java, ByteCode, Parameter]	7303	10549	
6	[Java, ByteCode, Member, Method]	READS	[Java, ByteCode, Member, Field]	6939	10549	
7	[Git, Commit, Log]	HAS_PARENT	[Git, Commit, Log]	6156	7618	
8	[Java, ByteCode, Parameter]	OF_TYPE	[Type, File, Java, ByteCode, JavaType]	5720	11184	
9	[Java, ByteCode, Bound]	OF_RAW_TYPE	[Type, File, Java, ByteCode, JavaType]	3213	6308	
10	[Java, ByteCode, Bound, ParameterizedType]	OF_RAW_TYPE	[Type, File, Java, ByteCode, JavaType]	2777	6537	
11	[Java, ByteCode, Bound, ParameterizedType]	HAS_ACTUAL_TYPE_ARGUMENT	[Java, ByteCode, Bound, WildcardType]	2722	6537	
12	[Java, ByteCode, Parameter]	OF_GENERIC_TYPE	[Java, ByteCode, Bound, ParameterizedType]	2434	11184	
13	[Java, ByteCode, Bound, ParameterizedType]	HAS_ACTUAL_TYPE_ARGUMENT	[Java, ByteCode, Bound, TypeVariable]	2228	6537	
14	[Java, ByteCode, Member, Constructor, Method]	WRITES	[Java, ByteCode, Member, Field]	1971	1647	
15	[Java, ByteCode, Member, Method]	RETURNS	[Type, File, Java, ByteCode, JavaType]	1889	10549	
16	[Java, Value, ByteCode, Annotation]	OF_TYPE	[Type, File, Java, ByteCode, ExternalAnnotatio...]	1842	2225	
17	[Java, ByteCode, Parameter]	OF_GENERIC_TYPE	[Java, ByteCode, Bound]	1818	11184	
18	[Java, ByteCode, Member, Constructor, Method]	INVOKES	[Java, ByteCode, Member, Constructor, Method]	1746	1647	
19	[Java, ByteCode, Member, Method]	INVOKES	[Java, ByteCode, Member, Constructor, Method]	1724	10549	
20	[Java, ByteCode, Member, Constructor, Method]	HAS	[Java, ByteCode, Parameter]	1710	1647	
21	[Java, ByteCode, Parameter]	ANNOTATED_BY	[Java, Value, ByteCode, Annotation]	1594	11184	
22	[Java, ByteCode, Member, Constructor, Method]	INVOKES	[Java, ByteCode, Member, Method]	1535	1647	
23	[Java, ByteCode, Member, Method, Lambda]	INVOKES	[Java, ByteCode, Member, Method]	1534	767	
24	[Java, ByteCode, Bound, ParameterizedType]	HAS_ACTUAL_TYPE_ARGUMENT	[Java, ByteCode, Bound]	1527	6537	
25	[Xml, Element]	HAS_ELEMENT	[Xml, Element]	1522	1534	
26	[Java, ByteCode, Member, Method]	RETURNS	[Type, File, Java, ByteCode, Void]	1464	10549	
27	[Type, File, Java, ByteCode, JavaType]	DECLARES	[Java, ByteCode, Member, Method]	1277	596	
28	[Java, ByteCode, GenericDeclaration, Member, M...]	INVOKES	[Java, ByteCode, Member, Method]	1276	510	

	sourceLabels	relationType	targetLabels	numberOfRelationships	numberOfNodesWithSameLabelsAsSource	numberOfNodesWithS
29	[Java, ByteCode, Member, Constructor, Method]	RETURNS	[Type, File, Java, ByteCode, Void]	1221	1647	

Graph Density

```
total_number_of_nodes (vertices): 68826
total_number_of_relationships (edges): 247789
-> total directed graph density: 5.230982568327809e-05
-> total directed graph density in percent: 0.005230982568327809
```