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: 68836
```

	nodeLabels	nodesWithThatLabels	nodesWithThatLabelsPercent
0	[Java, ByteCode, Parameter]	11184	16.247312
1	[Java, ByteCode, Method, Member]	10639	15.455576
2	[File, Git, Log]	7804	11.337091
3	[Git, Commit, Log]	7618	11.066884
4	[Java, ByteCode, Bound, ParameterizedType]	6537	9.496484
5	[Java, ByteCode, Bound]	6308	9.163810
6	[Java, ByteCode, Member, Field]	2849	4.138823
7	[Java, ByteCode, Bound, WildcardType]	2722	3.954326
8	[Java, Value, ByteCode, Annotation]	2225	3.232320
9	[Java, ByteCode, Constructor, Method, Member]	1644	2.388285
10	[Xml, Element]	1534	2.228485
11	[Xml, Text]	1016	1.475972
12	[Java, ByteCode, Bound, TypeVariable]	988	1.435295
13	[Java, ByteCode, Method, Member, Lambda]	767	1.114243
14	[Type, File, Java, ByteCode, Class]	699	1.015457
15	[Type, File, Java, ByteCode, JavaType]	596	0.865826
16	[Type, File, Java, ByteCode, ResolvedDuplicate...	542	0.787379
17	[Java, ByteCode, Method, Member, GenericDeclar...	525	0.762682
18	[Java, Value, ByteCode, Primitive]	467	0.678424
19	[Git, Author, Log]	260	0.377709
20	[Type, File, Java, ByteCode, Class, GenericDec...	215	0.312337
21	[Type, File, Java, ByteCode, ExternalType]	194	0.281829
22	[Type, File, Java, ByteCode, Interface]	166	0.241153
23	[Java, ByteCode, Bound, GenericArrayType]	144	0.209193
24	[Java, Value, ByteCode, Enum]	142	0.206287
25	[Maven, Dependency]	116	0.168516
26	[Value, Property]	109	0.158347
27	[Package, File, Directory, Java]	107	0.155442
28	[Value, Array]	104	0.151084
29	[Value, ManifestEntry]	91	0.132198

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', 'Method', 'Member']
- ['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', 'Constructor', 'Method', 'Member']
- ['Xml', 'Element']
- ['Xml', 'Text']
- ['Java', 'ByteCode', 'Bound', 'TypeVariable']
- ['Java', 'ByteCode', 'Method', 'Member', 'Lambda']
- ['Type', 'File', 'Java', 'ByteCode', 'Class']
- ['Type', 'File', 'Java', 'ByteCode', 'JavaType']
- ['Type', 'File', 'Java', 'ByteCode', 'ResolvedDuplicateType']
- ['Java', 'ByteCode', 'Method', 'Member', 'GenericDeclaration']
- ['Java', 'Value', 'ByteCode', 'Primitive']

Pie chart values: 16.25% (11184), 15.46% (10639), 11.34% (7804), 11.07% (7618), 9.50% (6537), 9.16% (6308), 4.14% (2849), 3.95% (2722), 3.23% (2225), 3.16% (2172), 2.39% (1644), 2.23% (1534), 1.48% (1016), 1.44% (988), 1.11% (767), 1.02% (699), 0.87% (596), 0.79% (542), 0.76% (525), 0.68% (467)
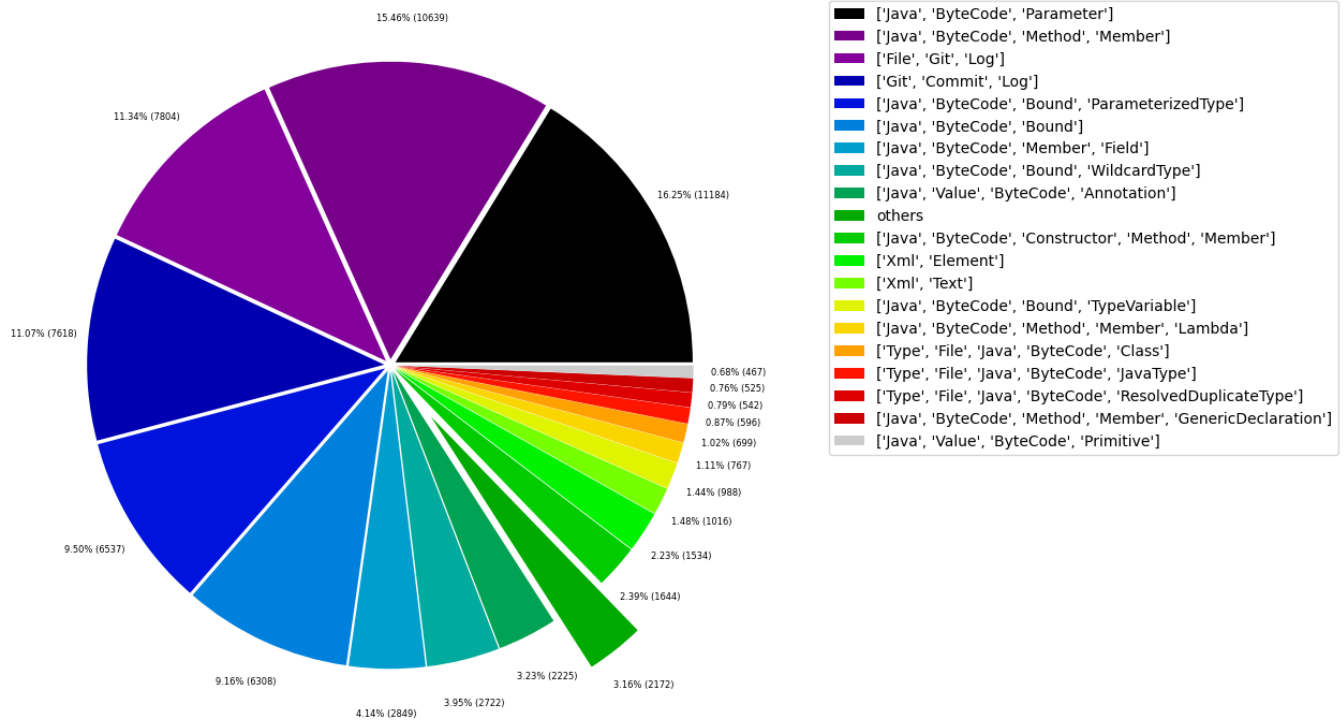
Table 1b - Lowest node count by label combination

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, Constructor, Method, Member, ...	3	0.004358
4	[File, Maven, Xml, Pom, Document]	6	0.008716
5	[Type, File, Java, ByteCode, Void]	6	0.008716
6	[Java, ManifestSection]	6	0.008716
7	[File, Java, Manifest]	6	0.008716
8	[Artifact, File, Jar, Archive, Zip, Java]	6	0.008716
9	[File, Java, Properties]	8	0.011622
10	[File, Java, ServiceLoader]	9	0.013075
11	[Xml, Attribute]	12	0.017433
12	[Maven, ExecutionGoal]	14	0.020338
13	[Maven, PluginExecution]	14	0.020338
14	[Maven, Plugin]	16	0.023244
15	[Maven, Configuration]	16	0.023244
16	[jQAssistant, Rule, Concept]	19	0.027602
17	[Type, File, Java, ByteCode, PrimitiveType]	21	0.030507
18	[Xml, Namespace]	24	0.034865
19	[Type, File, Java, ByteCode, Enum]	25	0.036318
20	[Java, Value, ByteCode, Class]	28	0.040676
21	[File, Directory]	29	0.042129
22	[Type, File, Java, ByteCode, Annotation]	40	0.058109
23	[Type, File, Java, ByteCode, ExternalType, Ext...	65	0.094427
24	[Artifact, Maven]	69	0.100238
25	[Type, File, Java, ByteCode, GenericDeclaratio...	79	0.114766
26	[Value, ManifestEntry]	91	0.132198
27	[Value, Array]	104	0.151084
28	[Package, File, Directory, Java]	107	0.155442
29	[Value, Property]	109	0.158347

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.
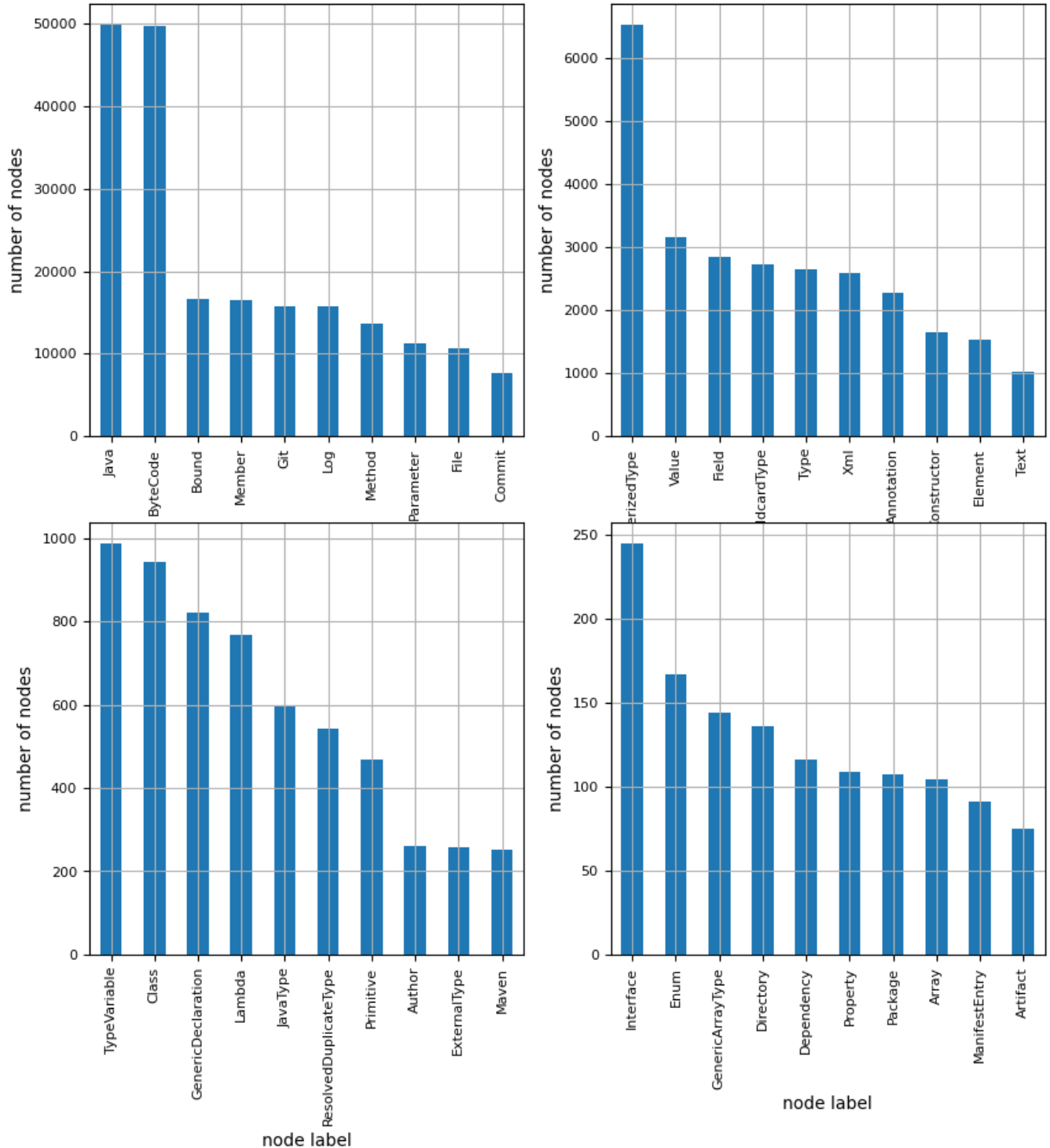
<Figure size 640x480 with 0 Axes>

Nodes per label combination (less than 0.5% overall)

■	['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', '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	49962	72.581208
1	ByteCode	49820	72.374920
2	Bound	16699	24.259109
3	Member	16427	23.863967
4	Git	15683	22.783137
5	Log	15682	22.781684
6	Method	13578	19.725144
7	Parameter	11184	16.247312
8	File	10623	15.432332
9	Commit	7618	11.066884
10	ParameterizedType	6537	9.496484
11	Value	3166	4.599338
12	Field	2849	4.138823
13	WildcardType	2722	3.954326
14	Type	2648	3.846824
15	Xml	2592	3.765472
16	Annotation	2265	3.290429
17	Constructor	1647	2.392643
18	Element	1534	2.228485
19	Text	1016	1.475972
20	TypeVariable	988	1.435295
21	Class	942	1.368470
22	GenericDeclaration	822	1.194143
23	Lambda	767	1.114243
24	JavaType	596	0.865826
25	ResolvedDuplicateType	542	0.787379
26	Primitive	467	0.678424
27	Author	260	0.377709
28	ExternalType	259	0.376257
29	Maven	252	0.366088
30	Interface	245	0.355918
31	Enum	167	0.242606
32	GenericArrayType	144	0.209193
33	Directory	136	0.197571
34	Dependency	116	0.168516
35	Property	109	0.158347
36	Package	107	0.155442
37	Array	104	0.151084
38	ManifestEntry	91	0.132198
39	Artifact	75	0.108955

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: 247788
```

	relationshipType	nodesWithThatRelationshipType	nodesWithThatRelationshipTypePercent
0	CONTAINS_CHANGED	45786	18.477892
1	INVOKES	29638	11.961031
2	OF_TYPE	17618	7.110110
3	DEPENDS_ON	17426	7.032625
4	DECLARES	16789	6.775550
5	OF_RAW_TYPE	15183	6.127415
6	HAS	11884	4.796035
7	RETURNS	10623	4.287133
8	HAS_FILE	7804	3.149466
9	READS	7683	3.100634
10	AUTHORED	7618	3.074402
11	HAS_COMMIT	7618	3.074402
12	HAS_ACTUAL_TYPE_ARGUMENT	7495	3.024763
13	HAS_PARENT	6162	2.486803
14	OF_GENERIC_TYPE	5346	2.157489
15	SIMILAR	3416	1.378598
16	RETURNS_GENERIC	3250	1.311605
17	WRITES	3065	1.236944
18	CONTAINS	3027	1.221609
19	RESOLVES_TO	2904	1.171970
20	ANNOTATED_BY	2213	0.893102
21	HAS_FIRST_CHILD	1534	0.619078
22	HAS_LAST_CHILD	1534	0.619078
23	HAS_ELEMENT	1522	0.614235
24	REQUIRES	1424	0.574685
25	HAS_UPPER_BOUND	1405	0.567017
26	EXTENDS	1267	0.511324
27	HAS_TEXT	1016	0.410028
28	HAS_SIBLING	1004	0.405185
29	DECLARES_TYPE_PARAMETER	971	0.391867

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.
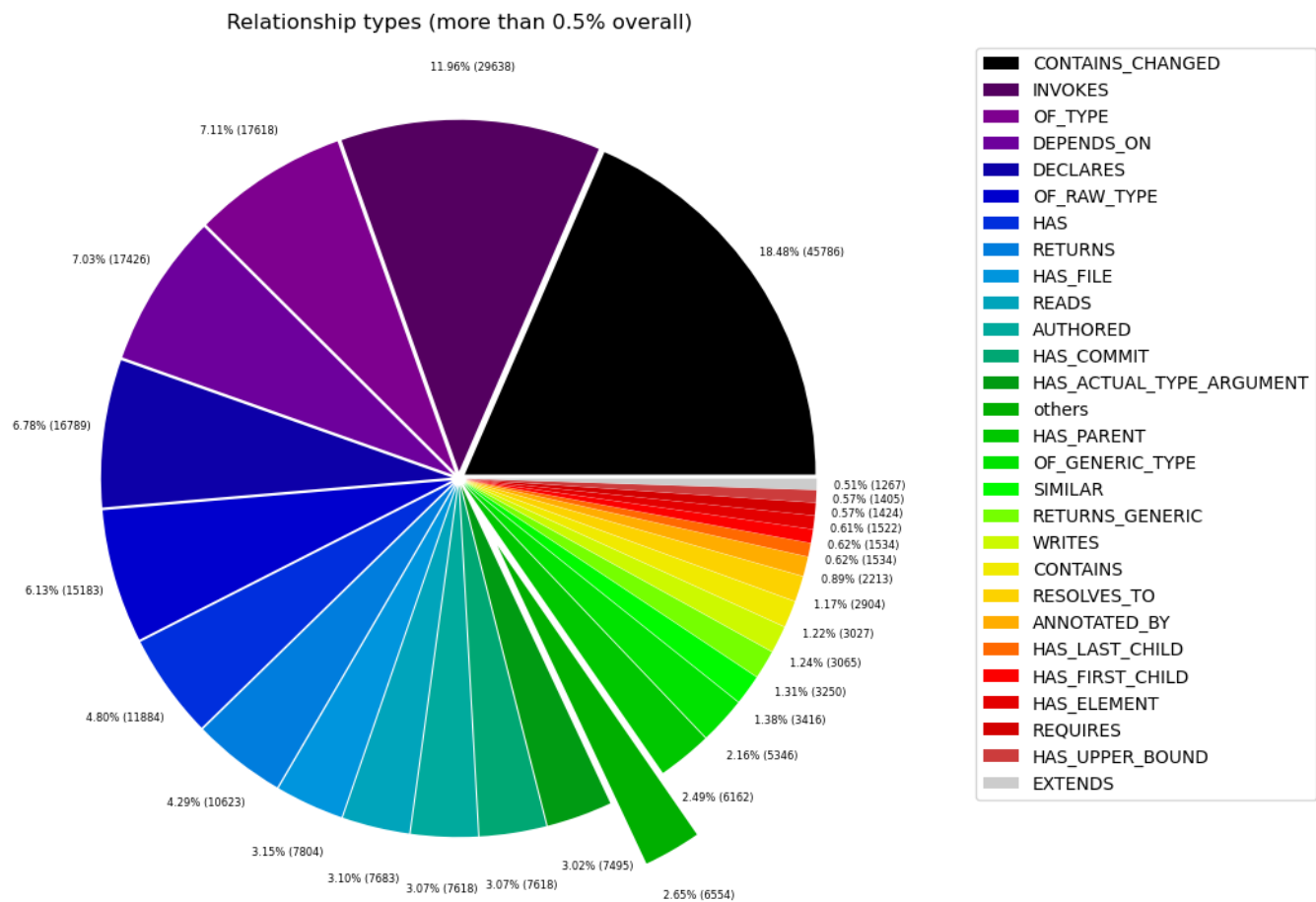
```
<Figure size 640x480 with 0 Axes>
```
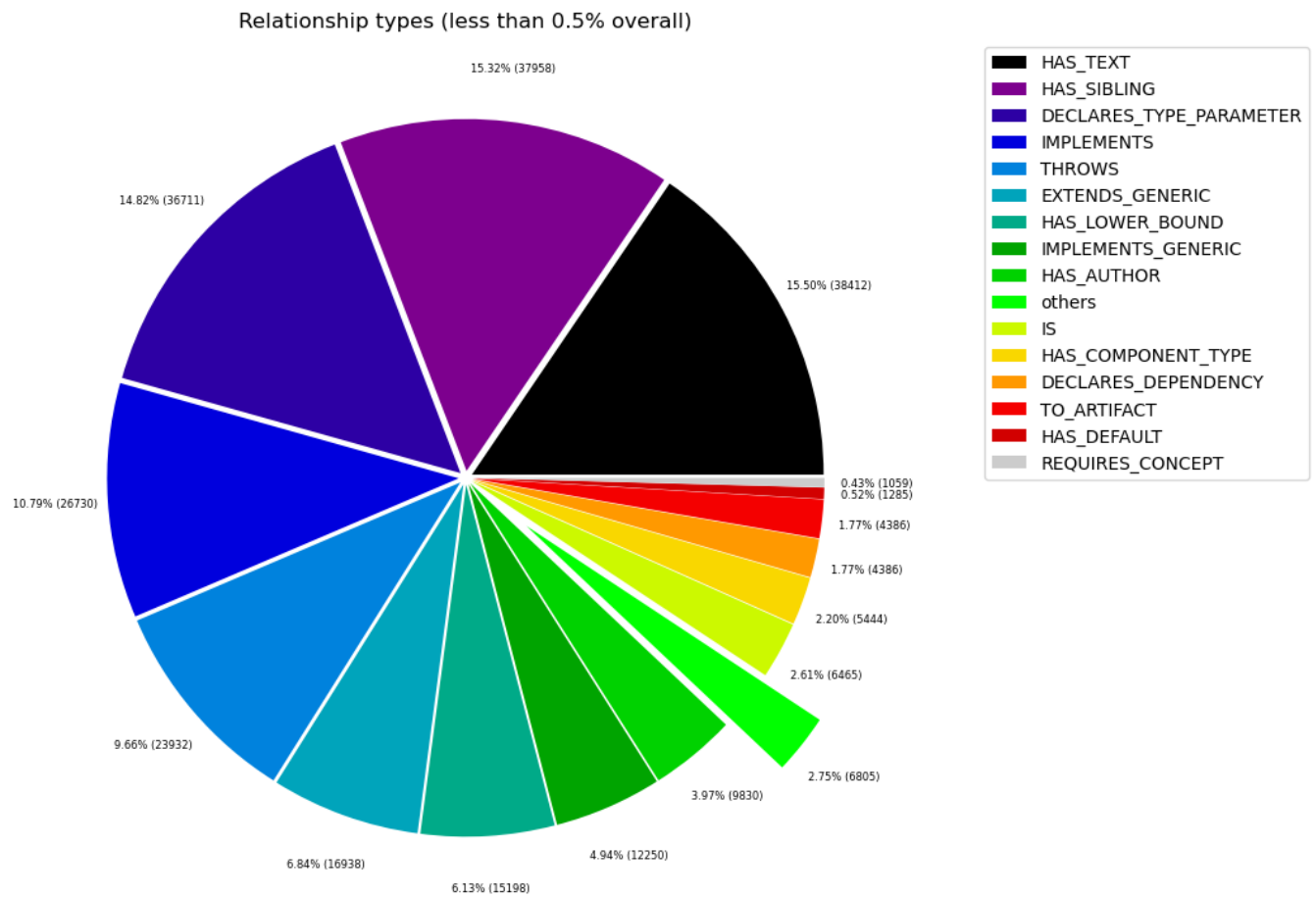
Relationship types (more than 0.5% overall)

11.96% (29638)

7.11% (17618)

7.03% (17426)

6.78% (16789)

6.13% (15183)

4.80% (11884)

4.29% (10623)

3.15% (7804)

3.10% (7683)   3.07% (7618)   3.07% (7618)

2.65% (6554)

2.49% (6162)

3.02% (7495)

18.48% (45786)

0.51% (1267)
0.57% (1405)
0.57% (1424)
0.61% (1522)
0.62% (1534)
0.62% (1534)
0.89% (2213)
1.17% (2904)
1.22% (3027)
1.24% (3065)
1.31% (3250)
1.38% (3416)
2.16% (5346)

- 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	0.069011
20	HAS_AUTHOR	260	0.104928
21	IMPLEMENTS_GENERIC	324	0.130757
22	HAS_LOWER_BOUND	402	0.162235
23	EXTENDS_GENERIC	448	0.180800
24	THROWS	633	0.255460
25	IMPLEMENTS	707	0.285325
26	DECLARES_TYPE_PARAMETER	971	0.391867
27	HAS_SIBLING	1004	0.405185
28	HAS_TEXT	1016	0.410028

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 (black)
- HAS_SIBLING (purple)
- DECLARES_TYPE_PARAMETER (dark violet)
- IMPLEMENTS (blue)
- THROWS (light blue)
- EXTENDS_GENERIC (teal)
- HAS_LOWER_BOUND (sea green)
- IMPLEMENTS_GENERIC (dark green)
- HAS_AUTHOR (green)
- others (bright green)
- IS (yellow)
- HAS_COMPONENT_TYPE (gold)
- DECLARES_DEPENDENCY (orange)
- TO_ARTIFACT (red)
- HAS_DEFAULT (dark red)
- REQUIRES_CONCEPT (grey)

Pie slice values:
- 15.50% (38412)
- 15.32% (37958)
- 14.82% (36711)
- 10.79% (26730)
- 9.66% (23932)
- 6.84% (16938)
- 6.13% (15198)
- 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, Method, Member]	INVOKES	[Java, ByteCode, Method, Member]	18132	10551	
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, Method, Member]	HAS	[Java, ByteCode, Parameter]	7290	10551	
6	[Java, ByteCode, Method, Member]	READS	[Java, ByteCode, Member, Field]	6906	10551	
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, Constructor, Method, Member]	WRITES	[Java, ByteCode, Member, Field]	1971	1644	
15	[Java, ByteCode, Method, Member]	RETURNS	[Type, File, Java, ByteCode, JavaType]	1890	10551	
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]	1818	11184	
18	[Java, ByteCode, Constructor, Method, Member]	INVOKES	[Java, ByteCode, Constructor, Method, Member]	1736	1644	
19	[Java, ByteCode, Constructor, Method, Member]	HAS	[Java, ByteCode, Parameter]	1710	1644	
20	[Java, ByteCode, Method, Member]	INVOKES	[Java, ByteCode, Constructor, Method, Member]	1706	10551	
21	[Java, ByteCode, Parameter]	ANNOTATED_BY	[Java, Value, ByteCode, Annotation]	1594	11184	
22	[Java, ByteCode, Constructor, Method, Member]	INVOKES	[Java, ByteCode, Method, Member]	1535	1644	
23	[Java, ByteCode, Method, Member, Lambda]	INVOKES	[Java, ByteCode, Method, Member]	1532	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, Method, Member]	RETURNS	[Type, File, Java, ByteCode, Void]	1465	10551	
27	[Java, ByteCode, Method, Member, GenericDeclar...]	INVOKES	[Java, ByteCode, Method, Member]	1280	511	
28	[Type, File, Java, ByteCode, JavaType]	DECLARES	[Java, ByteCode, Method, Member]	1277	596	
29	[Java, ByteCode, Constructor, Method, Member]	RETURNS	[Type, File, Java, ByteCode, Void]	1221	1644	

Graph Density

```
total_number_of_nodes (vertices): 68836
total_number_of_relationships (edges): 247788
-> total directed graph density: 5.229441723983005e-05
-> total directed graph density in percent: 0.005229441723983005
```