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: 68846
```

	nodeLabels	nodesWithThatLabels	nodesWithThatLabelsPercent
0	[Java, ByteCode, Parameter]	11184	16.244953
1	[Java, ByteCode, Method, Member]	10642	15.457688
2	[File, Git, Log]	7804	11.335444
3	[Git, Commit, Log]	7618	11.065276
4	[Java, ByteCode, Bound, ParameterizedType]	6537	9.495105
5	[Java, ByteCode, Bound]	6308	9.162479
6	[Java, ByteCode, Member, Field]	2849	4.138222
7	[Java, ByteCode, Bound, WildcardType]	2722	3.953752
8	[Java, Value, ByteCode, Annotation]	2225	3.231851
9	[Java, ByteCode, Constructor, Method, Member]	1651	2.398106
10	[Xml, Element]	1534	2.228161
11	[Xml, Text]	1016	1.475757
12	[Java, ByteCode, Bound, TypeVariable]	988	1.435087
13	[Java, ByteCode, Method, Member, Lambda]	767	1.114081
14	[Type, File, Java, ByteCode, Class]	699	1.015310
15	[Type, File, Java, ByteCode, JavaType]	596	0.865700
16	[Type, File, Java, ByteCode, ResolvedDuplicate...	542	0.787264
17	[Java, ByteCode, Method, Member, GenericDeclar...	525	0.762572
18	[Java, Value, ByteCode, Primitive]	467	0.678326
19	[Git, Author, Log]	260	0.377654
20	[Type, File, Java, ByteCode, Class, GenericDec...	215	0.312291
21	[Type, File, Java, ByteCode, ExternalType]	194	0.281788
22	[Type, File, Java, ByteCode, Interface]	166	0.241118
23	[Java, ByteCode, Bound, GenericArrayType]	144	0.209162
24	[Java, Value, ByteCode, Enum]	142	0.206257
25	[Maven, Dependency]	116	0.168492
26	[Value, Property]	109	0.158324
27	[Package, File, Directory, Java]	107	0.155419
28	[Value, Array]	104	0.151062
29	[Value, ManifestEntry]	91	0.132179

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)

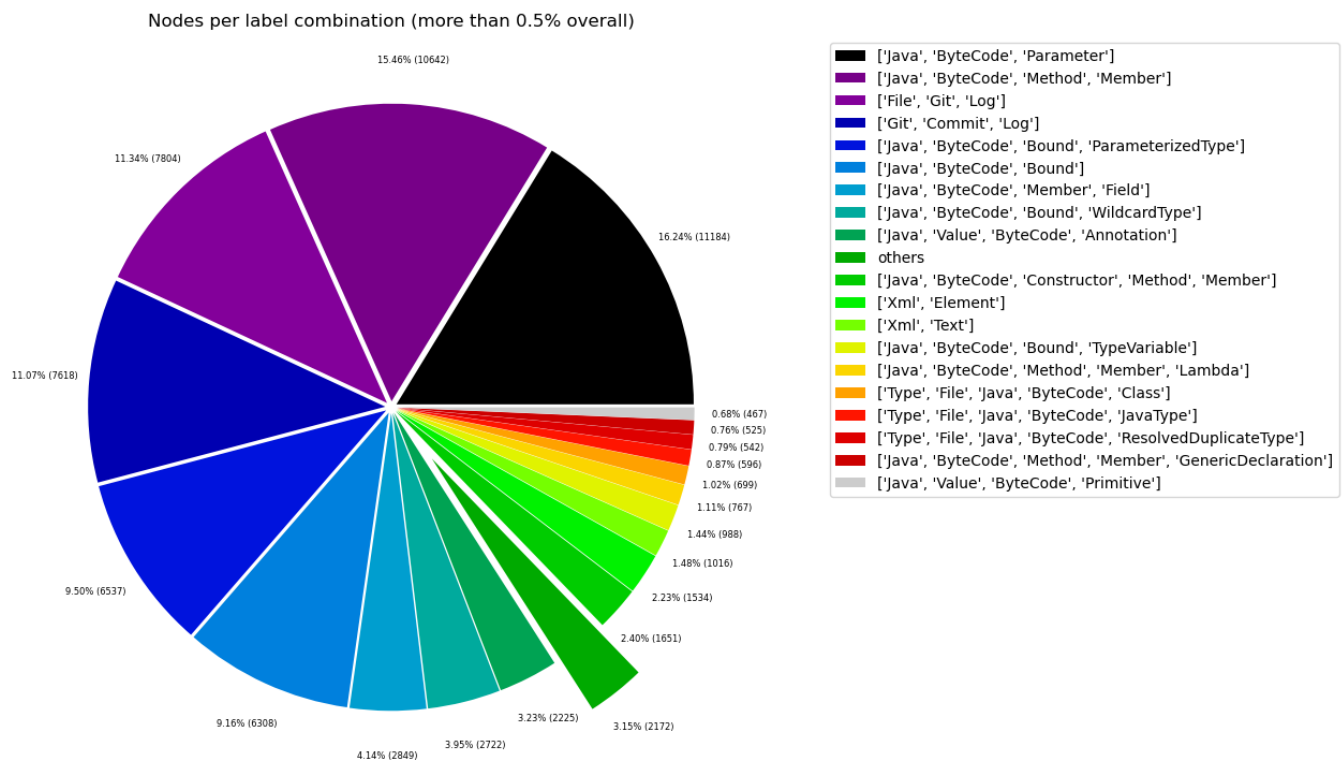| Color	Label combination
■	['Java', 'ByteCode', 'Parameter']
■	['Java', 'ByteCode', 'Method', 'Member']
■	['File', 'Git', 'Log']
■	['Git', 'Commit', 'Log']
■	['Java', 'ByteCode', 'Bound', 'ParameterizedType']
■	['Java', 'ByteCode', 'Bound']
■	['Java', 'ByteCode', 'Member', 'Field']
■	['Java', 'ByteCode', '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']

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	0.008715
5	[Type, File, Java, ByteCode, Void]	6	0.008715
6	[Java, ManifestSection]	6	0.008715
7	[File, Java, Manifest]	6	0.008715
8	[Artifact, File, Jar, Archive, Zip, Java]	6	0.008715
9	[File, Java, Properties]	8	0.011620
10	[File, Java, ServiceLoader]	9	0.013073
11	[Xml, Attribute]	12	0.017430
12	[Maven, ExecutionGoal]	14	0.020335
13	[Maven, PluginExecution]	14	0.020335
14	[Maven, Plugin]	16	0.023240
15	[Maven, Configuration]	16	0.023240
16	[jQAssistant, Rule, Concept]	19	0.027598
17	[Type, File, Java, ByteCode, PrimitiveType]	21	0.030503
18	[Xml, Namespace]	24	0.034860
19	[Type, File, Java, ByteCode, Enum]	25	0.036313
20	[Java, Value, ByteCode, Class]	28	0.040670
21	[File, Directory]	29	0.042123
22	[Type, File, Java, ByteCode, Annotation]	40	0.058101
23	[Type, File, Java, ByteCode, ExternalType, Ext...	65	0.094414
24	[Artifact, Maven]	69	0.100224
25	[Type, File, Java, ByteCode, GenericDeclaratio...	79	0.114749
26	[Value, ManifestEntry]	91	0.132179
27	[Value, Array]	104	0.151062
28	[Package, File, Directory, Java]	107	0.155419
29	[Value, Property]	109	0.158324

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.
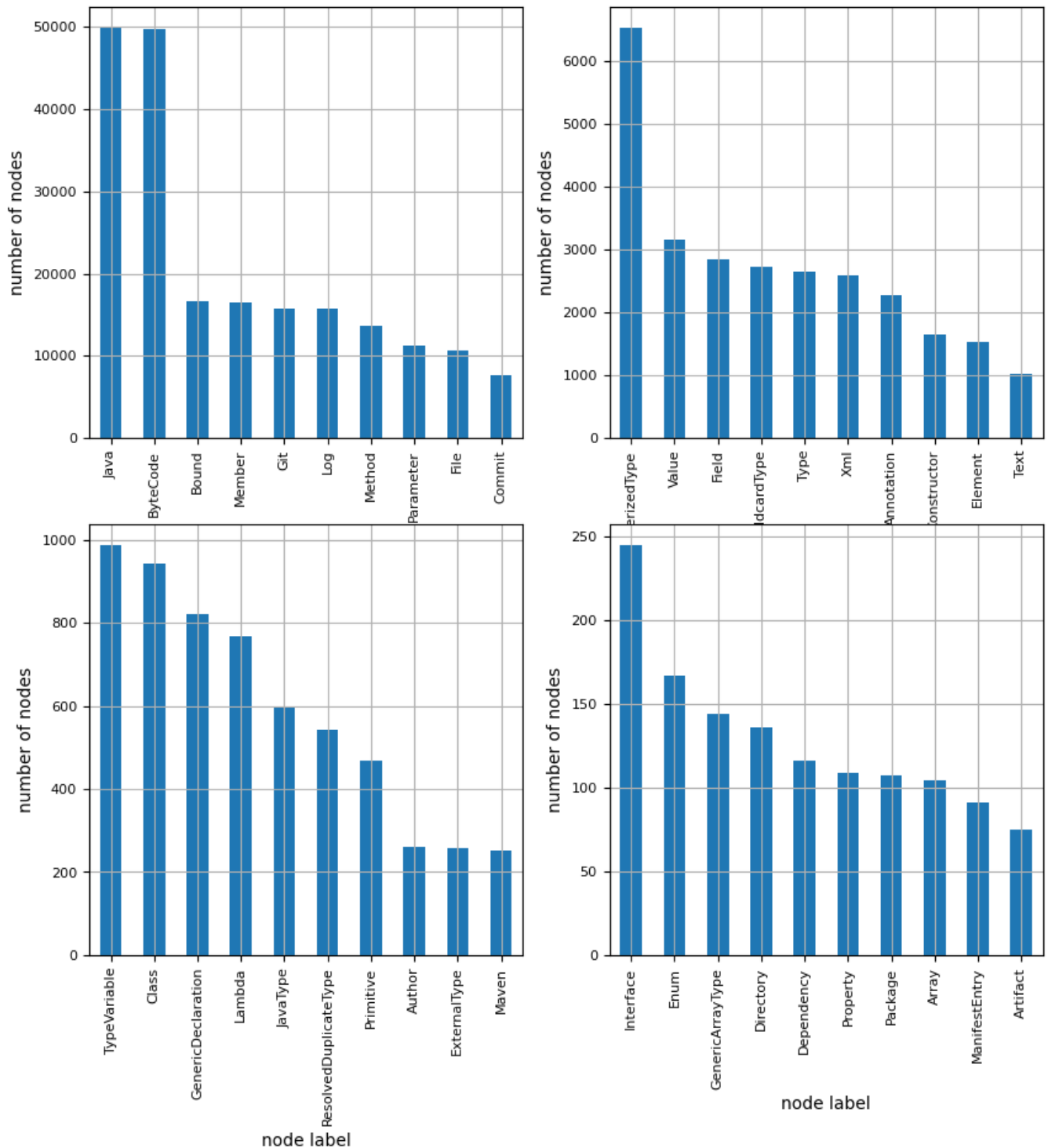
<Figure size 640x480 with 0 Axes>

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	49972	72.585190
1	ByteCode	49830	72.378933
2	Bound	16699	24.255585
3	Member	16437	23.875025
4	Git	15683	22.779827
5	Log	15682	22.778375
6	Method	13588	19.736804
7	Parameter	11184	16.244953
8	File	10623	15.430090
9	Commit	7618	11.065276
10	ParameterizedType	6537	9.495105
11	Value	3166	4.598669
12	Field	2849	4.138222
13	WildcardType	2722	3.953752
14	Type	2648	3.846266
15	Xml	2592	3.764925
16	Annotation	2265	3.289951
17	Constructor	1654	2.402463
18	Element	1534	2.228161
19	Text	1016	1.475757
20	TypeVariable	988	1.435087
21	Class	942	1.368271
22	GenericDeclaration	822	1.193969
23	Lambda	767	1.114081
24	JavaType	596	0.865700
25	ResolvedDuplicateType	542	0.787264
26	Primitive	467	0.678326
27	Author	260	0.377654
28	ExternalType	259	0.376202
29	Maven	252	0.366034
30	Interface	245	0.355867
31	Enum	167	0.242570
32	GenericArrayType	144	0.209162
33	Directory	136	0.197542
34	Dependency	116	0.168492
35	Property	109	0.158324
36	Package	107	0.155419
37	Array	104	0.151062
38	ManifestEntry	91	0.132179
39	Artifact	75	0.108939

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: 247817
```

	relationshipType	nodesWithThatRelationshipType	nodesWithThatRelationshipTypePercent
0	CONTAINS_CHANGED	45786	18.475730
1	INVOKES	29650	11.964474
2	OF_TYPE	17618	7.109278
3	DEPENDS_ON	17426	7.031802
4	DECLARES	16799	6.778792
5	OF_RAW_TYPE	15183	6.126698
6	HAS	11884	4.795474
7	RETURNS	10623	4.286631
8	HAS_FILE	7804	3.149098
9	READS	7683	3.100272
10	AUTHORED	7618	3.074043
11	HAS_COMMIT	7618	3.074043
12	HAS_ACTUAL_TYPE_ARGUMENT	7495	3.024409
13	HAS_PARENT	6162	2.486512
14	OF_GENERIC_TYPE	5346	2.157237
15	SIMILAR	3416	1.378437
16	RETURNS_GENERIC	3250	1.311452
17	WRITES	3065	1.236800
18	CONTAINS	3027	1.221466
19	RESOLVES_TO	2911	1.174657
20	ANNOTATED_BY	2213	0.892998
21	HAS_FIRST_CHILD	1534	0.619005
22	HAS_LAST_CHILD	1534	0.619005
23	HAS_ELEMENT	1522	0.614163
24	REQUIRES	1424	0.574618
25	HAS_UPPER_BOUND	1405	0.566951
26	EXTENDS	1267	0.511264
27	HAS_TEXT	1016	0.409980
28	HAS_SIBLING	1004	0.405138
29	DECLARES_TYPE_PARAMETER	971	0.391821

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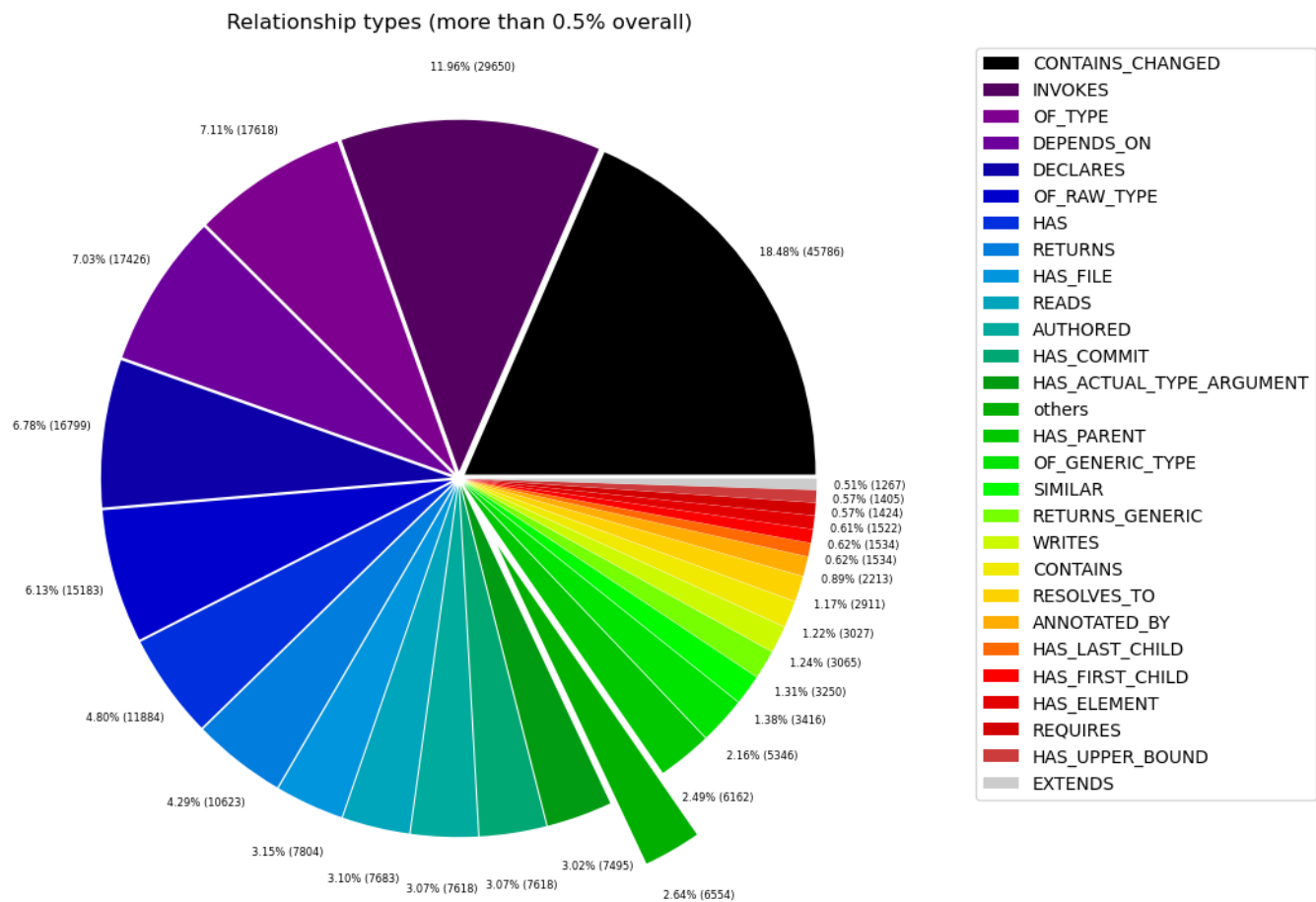
```
<Figure size 640x480 with 0 Axes>
```

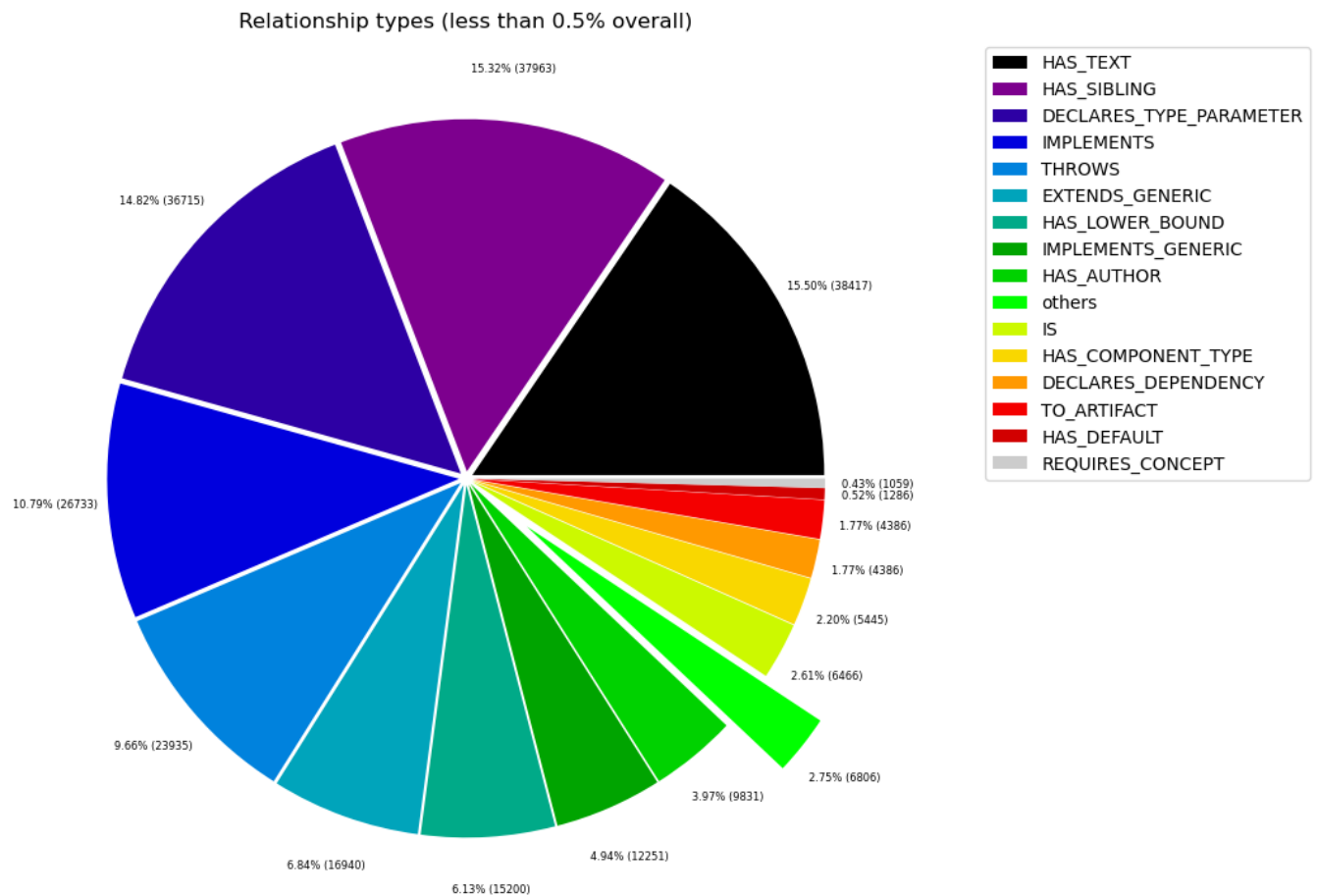Relationship types (more than 0.5% overall)

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	0.003228
4	OF_NAMESPACE	12	0.004842
5	HAS_ATTRIBUTE	12	0.004842
6	HAS_GOAL	14	0.005649
7	HAS_EXECUTION	14	0.005649
8	USES_PLUGIN	16	0.006456
9	IS_ARTIFACT	16	0.006456
10	HAS_CONFIGURATION	16	0.006456
11	REQUIRES_TYPE_PARAMETER	17	0.006860
12	INCLUDES_CONCEPT	19	0.007667
13	DECLARES_NAMESPACE	24	0.009685
14	REQUIRES_CONCEPT	28	0.011299
15	HAS_DEFAULT	34	0.013720
16	TO_ARTIFACT	116	0.046809
17	DECLARES_DEPENDENCY	116	0.046809
18	HAS_COMPONENT_TYPE	144	0.058107
19	IS	171	0.069003
20	HAS_AUTHOR	260	0.104916
21	IMPLEMENTS_GENERIC	324	0.130742
22	HAS_LOWER_BOUND	402	0.162216
23	EXTENDS_GENERIC	448	0.180779
24	THROWS	633	0.255430
25	IMPLEMENTS	707	0.285291
26	DECLARES_TYPE_PARAMETER	971	0.391821
27	HAS_SIBLING	1004	0.405138
28	HAS_TEXT	1016	0.409980

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

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	10554	
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	10554	
6	[Java, ByteCode, Method, Member]	READS	[Java, ByteCode, Member, Field]	6906	10554	
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	1651	
15	[Java, ByteCode, Method, Member]	RETURNS	[Type, File, Java, ByteCode, JavaType]	1890	10554	
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]	1746	1651	
19	[Java, ByteCode, Constructor, Method, Member]	HAS	[Java, ByteCode, Parameter]	1710	1651	
20	[Java, ByteCode, Method, Member]	INVOKES	[Java, ByteCode, Constructor, Method, Member]	1707	10554	
21	[Java, ByteCode, Parameter]	ANNOTATED_BY	[Java, Value, ByteCode, Annotation]	1594	11184	
22	[Java, ByteCode, Constructor, Method, Member]	INVOKES	[Java, ByteCode, Method, Member]	1535	1651	
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	10554	
27	[Java, ByteCode, Method, Member, GenericDeclar...]	INVOKES	[Java, ByteCode, Method, Member]	1282	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	1651	

Graph Density

```
total_number_of_nodes (vertices): 68846
total_number_of_relationships (edges): 247817
-> total directed graph density: 5.228534505159814e-05
-> total directed graph density in percent: 0.005228534505159814
```