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: 68813
```

	nodeLabels	nodesWithThatLabels	nodesWithThatLabelsPercent
0	[Java, ByteCode, Parameter]	11184	16.252743
1	[Java, ByteCode, Member, Method]	10615	15.425864
2	[File, Git, Log]	7804	11.340880
3	[Commit, Git, Log]	7618	11.070583
4	[Java, ByteCode, Bound, ParameterizedType]	6537	9.499658
5	[Java, ByteCode, Bound]	6308	9.166873
6	[Java, ByteCode, Member, Field]	2846	4.135846
7	[Java, ByteCode, Bound, WildcardType]	2722	3.955648
8	[Java, Value, ByteCode, Annotation]	2225	3.233401
9	[Java, ByteCode, Member, Constructor, Method]	1649	2.396350
10	[Xml, Element]	1534	2.229230
11	[Xml, Text]	1016	1.476465
12	[Java, ByteCode, Bound, TypeVariable]	988	1.435775
13	[Java, ByteCode, Member, Method, Lambda]	767	1.114615
14	[Type, File, Java, ByteCode, Class]	699	1.015796
15	[Type, File, Java, ByteCode, JavaType]	596	0.866115
16	[Type, File, Java, ByteCode, ResolvedDuplicate...	542	0.787642
17	[Java, ByteCode, GenericDeclaration, Member, M...	525	0.762937
18	[Java, Value, ByteCode, Primitive]	467	0.678651
19	[Author, Git, Log]	260	0.377836
20	[Type, File, Java, ByteCode, Class, GenericDec...	215	0.312441
21	[Type, File, Java, ByteCode, ExternalType]	194	0.281923
22	[Type, File, Java, ByteCode, Interface]	166	0.241233
23	[Java, ByteCode, Bound, GenericArrayType]	144	0.209263
24	[Java, Value, ByteCode, Enum]	142	0.206356
25	[Maven, Dependency]	116	0.168573
26	[Value, Property]	109	0.158400
27	[Package, File, Directory, Java]	107	0.155494
28	[Value, Array]	104	0.151134
29	[Value, ManifestEntry]	91	0.132242

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)

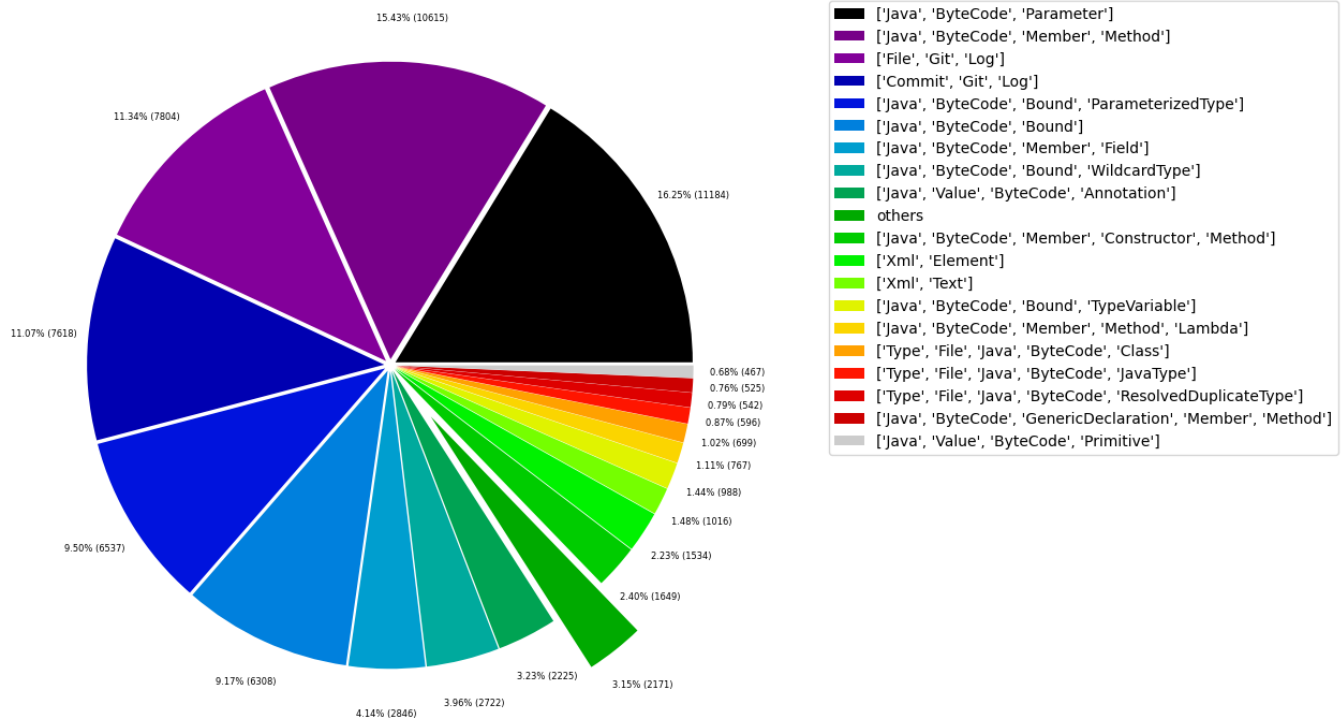| Legend	
■	['Java', 'ByteCode', 'Parameter']
■	['Java', 'ByteCode', 'Member', 'Method']
■	['File', 'Git', 'Log']
■	['Commit', 'Git', 'Log']
■	['Java', 'ByteCode', 'Bound', 'ParameterizedType']
■	['Java', 'ByteCode', 'Bound']
■	['Java', 'ByteCode', 'Member', 'Field']
■	['Java', 'ByteCode', 'Bound', 'WildcardType']
■	['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	[Analyze, Task, jQAssistant]	1	0.001453
1	[Maven, Exclusion]	1	0.001453
2	[Java, ByteCode, GenericDeclaration, Member, C...	3	0.004360
3	[Type, File, Java, ByteCode, Void]	6	0.008719
4	[File, Maven, Xml, Pom, Document]	6	0.008719
5	[Java, ManifestSection]	6	0.008719
6	[File, Java, Manifest]	6	0.008719
7	[Artifact, File, Jar, Archive, Zip, Java]	6	0.008719
8	[File, Java, Properties]	8	0.011626
9	[File, Java, ServiceLoader]	9	0.013079
10	[Xml, Attribute]	12	0.017439
11	[Maven, ExecutionGoal]	14	0.020345
12	[Maven, PluginExecution]	14	0.020345
13	[Maven, Plugin]	16	0.023251
14	[Maven, Configuration]	16	0.023251
15	[jQAssistant, Rule, Concept]	19	0.027611
16	[Type, File, Java, ByteCode, PrimitiveType]	21	0.030517
17	[Xml, Namespace]	24	0.034877
18	[Type, File, Java, ByteCode, Enum]	25	0.036330
19	[Java, Value, ByteCode, Class]	28	0.040690
20	[File, Directory]	29	0.042143
21	[Type, File, Java, ByteCode, Annotation]	40	0.058129
22	[Type, File, Java, ByteCode, ExternalAnnotatio...	65	0.094459
23	[Artifact, Maven]	69	0.100272
24	[Type, File, Java, ByteCode, GenericDeclaratio...	79	0.114804
25	[Value, ManifestEntry]	91	0.132242
26	[Value, Array]	104	0.151134
27	[Package, File, Directory, Java]	107	0.155494
28	[Value, Property]	109	0.158400
29	[Maven, Dependency]	116	0.168573

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)

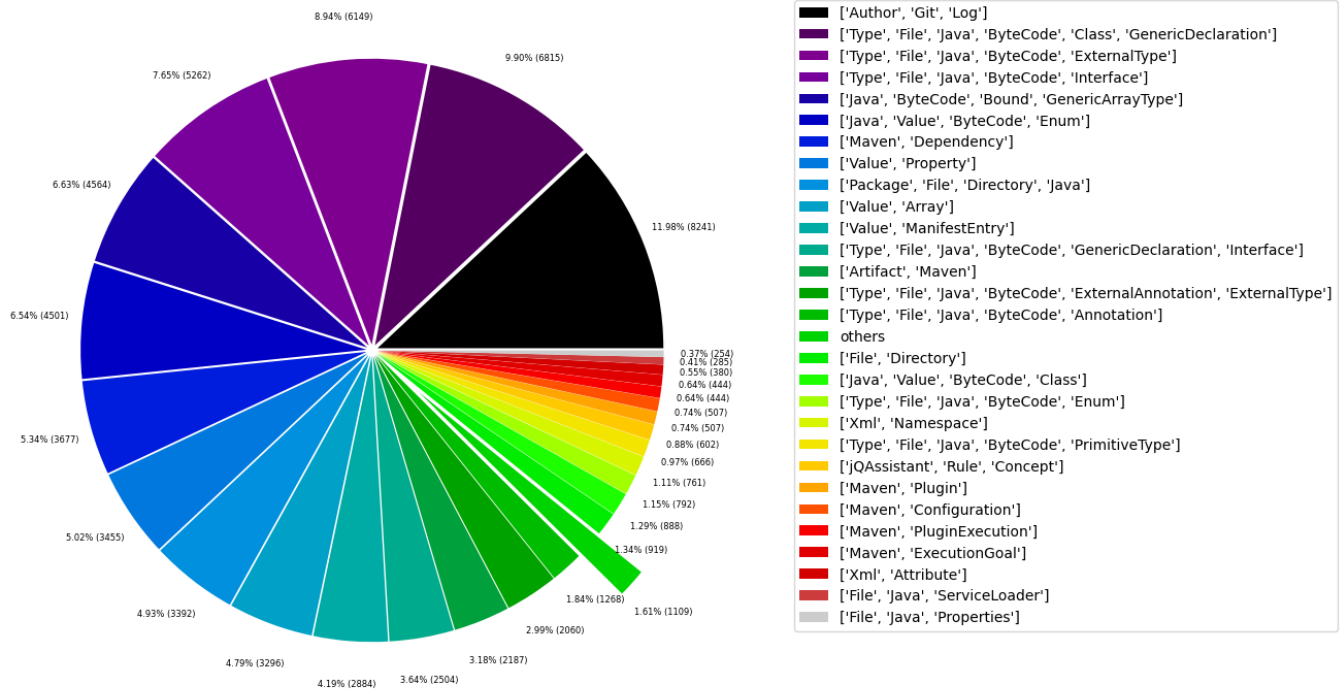| Color	Label
■	['Author', 'Git', 'Log']
■	['Type', 'File', 'Java', 'ByteCode', 'Class', 'GenericDeclaration']
■	['Type', 'File', 'Java', 'ByteCode', 'ExternalType']
■	['Type', 'File', 'Java', 'ByteCode', 'Interface']
■	['Java', 'ByteCode', 'Bound', 'GenericArrayType']
■	['Java', 'Value', 'ByteCode', '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.
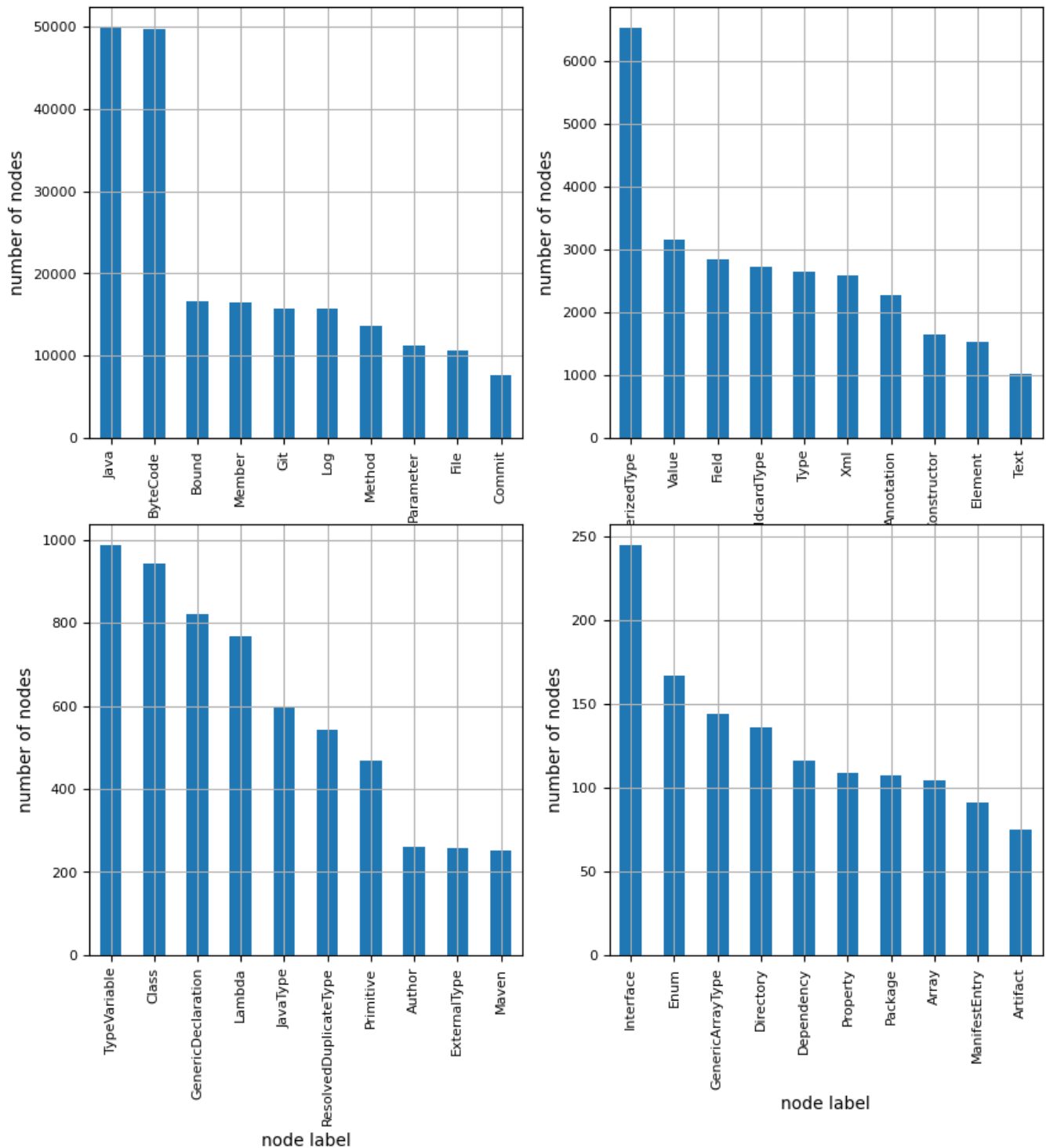
	nodeLabel	nodesWithThatLabel	nodesWithThatLabelPercent
0	Java	49940	72.573496
1	ByteCode	49798	72.367140
2	Bound	16699	24.267217
3	Member	16405	23.839972
4	Git	15682	22.789299
5	Log	15682	22.789299
6	Method	13559	19.704126
7	Parameter	11184	16.252743
8	File	10623	15.437490
9	Commit	7618	11.070583
10	ParameterizedType	6537	9.499658
11	Value	3166	4.600875
12	Field	2846	4.135846
13	WildcardType	2722	3.955648
14	Type	2648	3.848110
15	Xml	2592	3.766730
16	Annotation	2265	3.291529
17	Constructor	1652	2.400709
18	Element	1534	2.229230
19	Text	1016	1.476465
20	TypeVariable	988	1.435775
21	Class	942	1.368927
22	GenericDeclaration	822	1.194542
23	Lambda	767	1.114615
24	JavaType	596	0.866115
25	ResolvedDuplicateType	542	0.787642
26	Primitive	467	0.678651
27	Author	260	0.377836
28	ExternalType	259	0.376382
29	Maven	252	0.366210
30	Interface	245	0.356037
31	Enum	167	0.242687
32	GenericArrayType	144	0.209263
33	Directory	136	0.197637
34	Dependency	116	0.168573
35	Property	109	0.158400
36	Package	107	0.155494
37	Array	104	0.151134
38	ManifestEntry	91	0.132242
39	Artifact	75	0.108991

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: 232065
```

	relationshipType	nodesWithThatRelationshipType	nodesWithThatRelationshipTypePercent
0	CONTAINS_CHANGED	45786	19.729817
1	INVOKES	29614	12.761080
2	OF_TYPE	17618	7.591838
3	DEPENDS_ON	17426	7.509103
4	DECLARES	16767	7.225131
5	OF_RAW_TYPE	15183	6.542564
6	HAS	11884	5.120979
7	RETURNS	10623	4.577597
8	READS	7684	3.311141
9	AUTHORED	7618	3.282701
10	HAS_ACTUAL_TYPE_ARGUMENT	7495	3.229699
11	HAS_PARENT	6162	2.655291
12	OF_GENERIC_TYPE	5346	2.303665
13	SIMILAR	3416	1.472001
14	RETURNS_GENERIC	3250	1.400470
15	WRITES	3065	1.320751
16	CONTAINS	3027	1.304376
17	RESOLVES_TO	2908	1.253097
18	ANNOTATED_BY	2213	0.953612
19	HAS_FIRST_CHILD	1534	0.661022
20	HAS_LAST_CHILD	1534	0.661022
21	HAS_ELEMENT	1522	0.655851
22	REQUIRES	1424	0.613621
23	HAS_UPPER_BOUND	1405	0.605434
24	EXTENDS	1267	0.545968
25	HAS_TEXT	1016	0.437808
26	HAS_SIBLING	1004	0.432637
27	DECLARES_TYPE_PARAMETER	971	0.418417
28	IMPLEMENTS	707	0.304656
29	THROWS	633	0.272768

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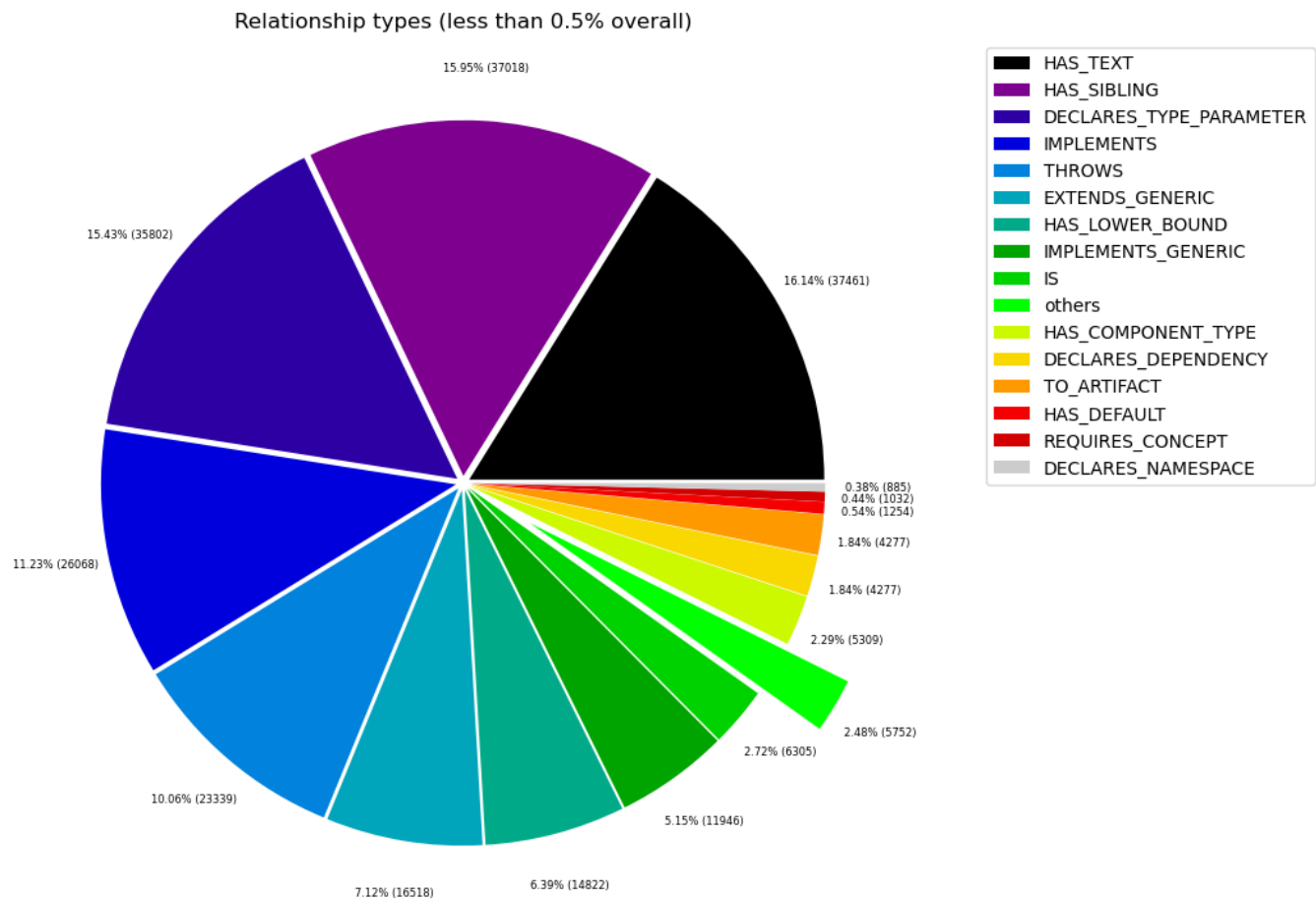
```
<Figure size 640x480 with 0 Axes>
```

Relationship types (more than 0.5% overall)

Legend	
■	CONTAINS_CHANGED
■	INVOKES
■	OF_TYPE
■	DEPENDS_ON
■	DECLARES
■	OF_RAW_TYPE
■	HAS
■	RETURNS
■	READS
■	AUTHORED
■	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	0.000431
1	THROWS_GENERIC	5	0.002155
2	DESCRIBES	6	0.002585
3	HAS_ROOT_ELEMENT	8	0.003447
4	OF_NAMESPACE	12	0.005171
5	HAS_ATTRIBUTE	12	0.005171
6	HAS_GOAL	14	0.006033
7	HAS_EXECUTION	14	0.006033
8	USES_PLUGIN	16	0.006895
9	IS_ARTIFACT	16	0.006895
10	HAS_CONFIGURATION	16	0.006895
11	REQUIRES_TYPE_PARAMETER	17	0.007326
12	INCLUDES_CONCEPT	19	0.008187
13	DECLARES_NAMESPACE	24	0.010342
14	REQUIRES_CONCEPT	28	0.012066
15	HAS_DEFAULT	34	0.014651
16	TO_ARTIFACT	116	0.049986
17	DECLARES_DEPENDENCY	116	0.049986
18	HAS_COMPONENT_TYPE	144	0.062052
19	IS	171	0.073686
20	IMPLEMENTS_GENERIC	324	0.139616
21	HAS_LOWER_BOUND	402	0.173227
22	EXTENDS_GENERIC	448	0.193049
23	THROWS	633	0.272768
24	IMPLEMENTS	707	0.304656
25	DECLARES_TYPE_PARAMETER	971	0.418417
26	HAS_SIBLING	1004	0.432637
27	HAS_TEXT	1016	0.437808

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
- IS
- others
- HAS_COMPONENT_TYPE
- DECLARES_DEPENDENCY
- TO_ARTIFACT
- HAS_DEFAULT
- REQUIRES_CONCEPT
- DECLARES_NAMESPACE

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	[Commit, Git, Log]	CONTAINS_CHANGED	[File, Git, Log]	45786	7618	
1	[Java, ByteCode, Member, Method]	INVOKES	[Java, ByteCode, Member, Method]	18173	10535	
2	[Author, Git, Log]	AUTHORED	[Commit, Git, Log]	7618	260	
3	[Java, ByteCode, Member, Method]	HAS	[Java, ByteCode, Parameter]	7303	10535	
4	[Java, ByteCode, Member, Method]	READS	[Java, ByteCode, Member, Field]	6939	10535	
5	[Commit, Git, Log]	HAS_PARENT	[Commit, Git, Log]	6156	7618	
6	[Java, ByteCode, Parameter]	OF_TYPE	[Type, File, Java, ByteCode, JavaType]	5720	11184	
7	[Java, ByteCode, Bound]	OF_RAW_TYPE	[Type, File, Java, ByteCode, JavaType]	3213	6308	
8	[Java, ByteCode, Bound, ParameterizedType]	OF_RAW_TYPE	[Type, File, Java, ByteCode, JavaType]	2777	6537	
9	[Java, ByteCode, Bound, ParameterizedType]	HAS_ACTUAL_TYPE_ARGUMENT	[Java, ByteCode, Bound, WildcardType]	2722	6537	
10	[Java, ByteCode, Parameter]	OF_GENERIC_TYPE	[Java, ByteCode, Bound, ParameterizedType]	2434	11184	
11	[Java, ByteCode, Bound, ParameterizedType]	HAS_ACTUAL_TYPE_ARGUMENT	[Java, ByteCode, Bound, TypeVariable]	2228	6537	
12	[Java, ByteCode, Member, Constructor, Method]	WRITES	[Java, ByteCode, Member, Field]	1971	1649	
13	[Java, ByteCode, Member, Method]	RETURNS	[Type, File, Java, ByteCode, JavaType]	1889	10535	
14	[Java, Value, ByteCode, Annotation]	OF_TYPE	[Type, File, Java, ByteCode, ExternalAnnotatio...]	1842	2225	
15	[Java, ByteCode, Parameter]	OF_GENERIC_TYPE	[Java, ByteCode, Bound]	1818	11184	
16	[Java, ByteCode, Member, Constructor, Method]	INVOKES	[Java, ByteCode, Member, Constructor, Method]	1746	1649	
17	[Java, ByteCode, Member, Method]	INVOKES	[Java, ByteCode, Member, Constructor, Method]	1724	10535	
18	[Java, ByteCode, Member, Constructor, Method]	HAS	[Java, ByteCode, Parameter]	1710	1649	
19	[Java, ByteCode, Parameter]	ANNOTATED_BY	[Java, Value, ByteCode, Annotation]	1594	11184	
20	[Java, ByteCode, Member, Method, Lambda]	INVOKES	[Java, ByteCode, Member, Method]	1534	767	
21	[Java, ByteCode, Member, Constructor, Method]	INVOKES	[Java, ByteCode, Member, Method]	1531	1649	
22	[Java, ByteCode, Bound, ParameterizedType]	HAS_ACTUAL_TYPE_ARGUMENT	[Java, ByteCode, Bound]	1527	6537	
23	[Xml, Element]	HAS_ELEMENT	[Xml, Element]	1522	1534	
24	[Java, ByteCode, Member, Method]	RETURNS	[Type, File, Java, ByteCode, Void]	1464	10535	
25	[Type, File, Java, ByteCode, JavaType]	DECLARES	[Java, ByteCode, Member, Method]	1277	596	
26	[Java, ByteCode, GenericDeclaration, Member, M...]	INVOKES	[Java, ByteCode, Member, Method]	1274	510	
27	[Java, ByteCode, Member, Constructor, Method]	RETURNS	[Type, File, Java, ByteCode, Void]	1221	1649	

	sourceLabels	relationType	targetLabels	numberOfRelationships	numberOfNodesWithSameLabelsAsSource	numberOfNodesWithS
28	[Java, ByteCode, Member, Field]	OF_TYPE	[Type, File, Java, ByteCode, JavaType]	1170	2846	
29	[Java, ByteCode, Member, Method]	RETURNS_GENERIC	[Java, ByteCode, Bound, ParameterizedType]	1159	10535	

Graph Density

```
total_number_of_nodes (vertices): 68813
total_number_of_relationships (edges): 232065
-> total directed graph density: 4.900890199161407e-05
-> total directed graph density in percent: 0.004900890199161408
```