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: 319208
```

	nodeLabels	nodesWithThatLabels	nodesWithThatLabelsPercent
0	[Git, Change]	231259	72.447746
1	[Java, ByteCode, Method, Member]	13172	4.126463
2	[Java, ByteCode, Parameter]	12968	4.062555
3	[Git, Commit]	11659	3.652477
4	[File, Git]	10572	3.311947
5	[Java, ByteCode, Bound, ParameterizedType]	7154	2.241172
6	[Java, ByteCode, Bound]	7094	2.222375
7	[Java, ByteCode, Member, Field]	3483	1.091138
8	[Java, ByteCode, Bound, WildcardType]	2902	0.909125
9	[Java, Value, ByteCode, Annotation]	2813	0.881244
10	[Xml, Element]	2144	0.671662
11	[Java, ByteCode, Constructor, Method, Member]	2027	0.635009
12	[Xml, Text]	1436	0.449863
13	[Java, ByteCode, Bound, TypeVariable]	1094	0.342723
14	[Java, ByteCode, Method, Member, Lambda]	931	0.291659
15	[Type, File, Java, ByteCode, ResolvedDuplicate...	899	0.281635
16	[Type, File, Java, ByteCode, Class]	858	0.268790
17	[Type, File, Java, ByteCode, JavaType]	746	0.233703
18	[Java, Value, ByteCode, Primitive]	647	0.202689
19	[Java, ByteCode, Method, Member, GenericDeclar...	567	0.177627
20	[Json, Key]	555	0.173868
21	[Value, Json, Scalar]	539	0.168855
22	[Type, File, Java, ByteCode, ExternalType]	396	0.124057
23	[Author, Git, Person]	288	0.090223
24	[Value, Array]	267	0.083645
25	[Committer, Git, Person]	242	0.075813
26	[Type, File, Java, ByteCode, Class, GenericDec...	236	0.073933
27	[Value, Property]	202	0.063282
28	[Type, File, Java, ByteCode, Interface]	186	0.058269
29	[Java, Value, ByteCode, Class]	170	0.053257

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:
- ['Git', 'Change']
- ['Java', 'ByteCode', 'Method', 'Member']
- ['Java', 'ByteCode', 'Parameter']
- others
- ['Git', 'Commit']
- ['File', 'Git']
- ['Java', 'ByteCode', 'Bound', 'ParameterizedType']
- ['Java', 'ByteCode', 'Bound']
- ['Java', 'ByteCode', 'Member', 'Field']
- ['Java', 'ByteCode', 'Bound', 'WildcardType']
- ['Java', 'Value', 'ByteCode', 'Annotation']
- ['Xml', 'Element']
- ['Java', 'ByteCode', 'Constructor', 'Method', 'Member']

Pie slice labels: 72.45% (231259), 0.64% (2027), 0.67% (2144), 0.88% (2813), 0.91% (2902), 1.09% (3483), 2.22% (7094), 2.24% (7154), 3.31% (10572), 3.65% (11659), 3.75% (11961), 4.06% (12968), 4.13% (13172)
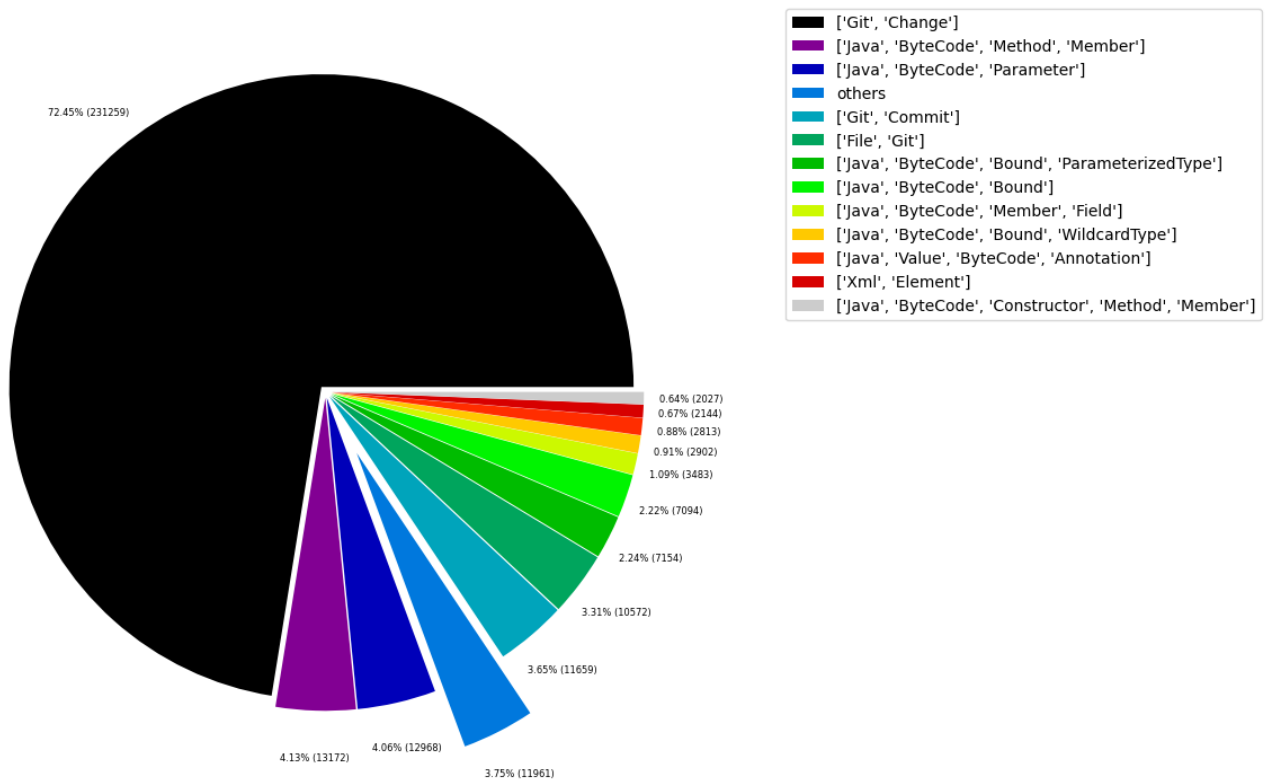
Table 1b - Lowest node count by label combination

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	0.000313
1	[File, TS, Scan]	1	0.000313
2	[File, Json]	2	0.000627
3	[File]	3	0.000940
4	[Java, ByteCode, Constructor, Method, Member, ...	4	0.001253
5	[Maven, Exclusion]	5	0.001566
6	[Value, Array, Json]	6	0.001880
7	[File, Xml, Maven, Pom, Document]	9	0.002819
8	[Type, File, Java, ByteCode, Void]	9	0.002819
9	[Java, ManifestSection]	9	0.002819
10	[File, Java, Manifest]	9	0.002819
11	[Artifact, File, Jar, Archive, Zip, Java]	9	0.002819
12	[File, Java, ServiceLoader]	10	0.003133
13	[File, Java, Properties]	12	0.003759
14	[Maven, ExecutionGoal]	16	0.005012
15	[Maven, PluginExecution]	16	0.005012
16	[Xml, Attribute]	18	0.005639
17	[jQAssistant, Rule, Concept]	19	0.005952
18	[Maven, Plugin]	21	0.006579
19	[Maven, Configuration]	21	0.006579
20	[Git, Branch]	25	0.007832
21	[Type, File, Java, ByteCode, Enum]	28	0.008772
22	[Type, File, Java, ByteCode, PrimitiveType]	29	0.009085
23	[Xml, Namespace]	36	0.011278
24	[Type, File, Java, ByteCode, Annotation]	43	0.013471
25	[File, Directory]	44	0.013784
26	[Type, File, Java, ByteCode, GenericDeclaratio...	85	0.026628
27	[Artifact, Maven]	92	0.028821
28	[Type, File, Java, ByteCode, ExternalType, Ext...	93	0.029135
29	[Value, ManifestEntry]	120	0.037593

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)

Pie chart labels:
- 7.78% (24846)
- 7.52% (23992)
- 9.15% (29196)
- 7.17% (22898)
- 12.01% (38323)
- 6.24% (19909)
- 5.41% (17267)
- 0.30% (961)
- 0.36% (1148)
- 0.37% (1174)
- 0.71% (2268)
- 0.77% (2455)
- 0.78% (2482)
- 1.00% (3202)
- 1.10% (3523)
- 1.16% (3710)
- 1.25% (4003)
- 1.32% (4217)
- 1.36% (4350)
- 1.38% (4403)
- 1.42% (4537)
- 1.56% (4964)
- 1.69% (5391)
- 1.97% (6298)
- 2.02% (6458)
- 2.23% (7126)
- 2.36% (7526)
- 2.41% (7686)
- 3.31% (10568)
- 4.51% (14385)
- 4.64% (14812)
- 4.74% (15132)

Legend:
- ['Xml', 'Text']
- ['Java', 'ByteCode', 'Bound', 'TypeVariable']
- ['Java', 'ByteCode', 'Method', 'Member', 'Lambda']
- ['Type', 'File', 'Java', 'ByteCode', 'ResolvedDuplicateType']
- ['Type', 'File', 'Java', 'ByteCode', 'Class']
- ['Type', 'File', 'Java', 'ByteCode', 'JavaType']
- ['Java', 'Value', 'ByteCode', 'Primitive']
- ['Java', 'ByteCode', 'Method', 'Member', 'GenericDeclaration']
- ['Json', 'Key']
- ['Value', 'Json', 'Scalar']
- ['Type', 'File', 'Java', 'ByteCode', 'ExternalType']
- ['Author', 'Git', 'Person']
- others
- ['Value', 'Array']
- ['Committer', 'Git', 'Person']
- ['Type', 'File', 'Java', 'ByteCode', 'Class', 'GenericDeclaration']
- ['Value', 'Property']
- ['Type', 'File', 'Java', 'ByteCode', 'Interface']
- ['Java', 'Value', 'ByteCode', 'Class']
- ['Git', 'Tag']
- ['Maven', 'Dependency']
- ['Java', 'ByteCode', 'Bound', 'GenericArrayType']
- ['Java', 'Value', 'ByteCode', 'Enum']
- ['Package', 'File', 'Directory', 'Java']
- ['Value', 'Json', 'Object']
- ['Value', 'ManifestEntry']
- ['Type', 'File', 'Java', 'ByteCode', 'ExternalType', 'ExternalAnnotation']
- ['Artifact', 'Maven']
- ['Type', 'File', 'Java', 'ByteCode', 'GenericDeclaration', 'Interface']
- ['File', 'Directory']
- ['Type', 'File', 'Java', 'ByteCode', 'Annotation']
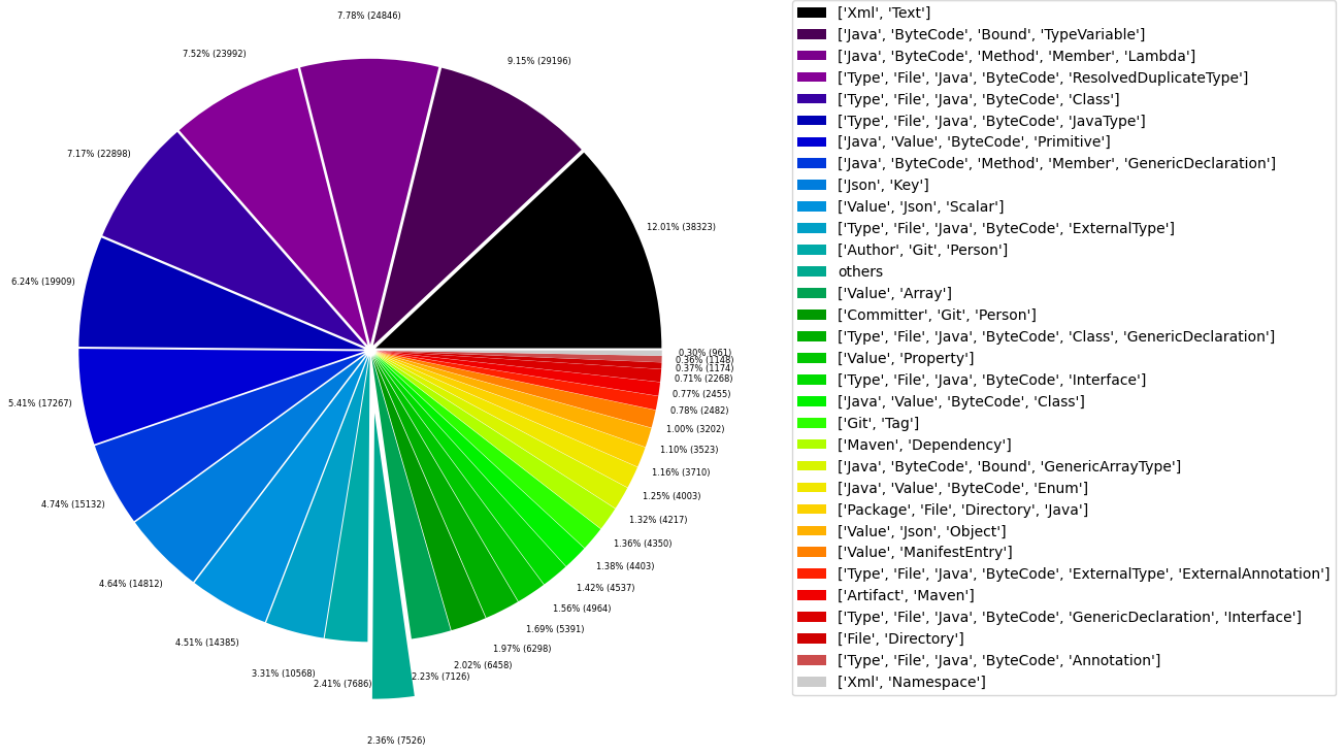- ['Xml', 'Namespace']

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.
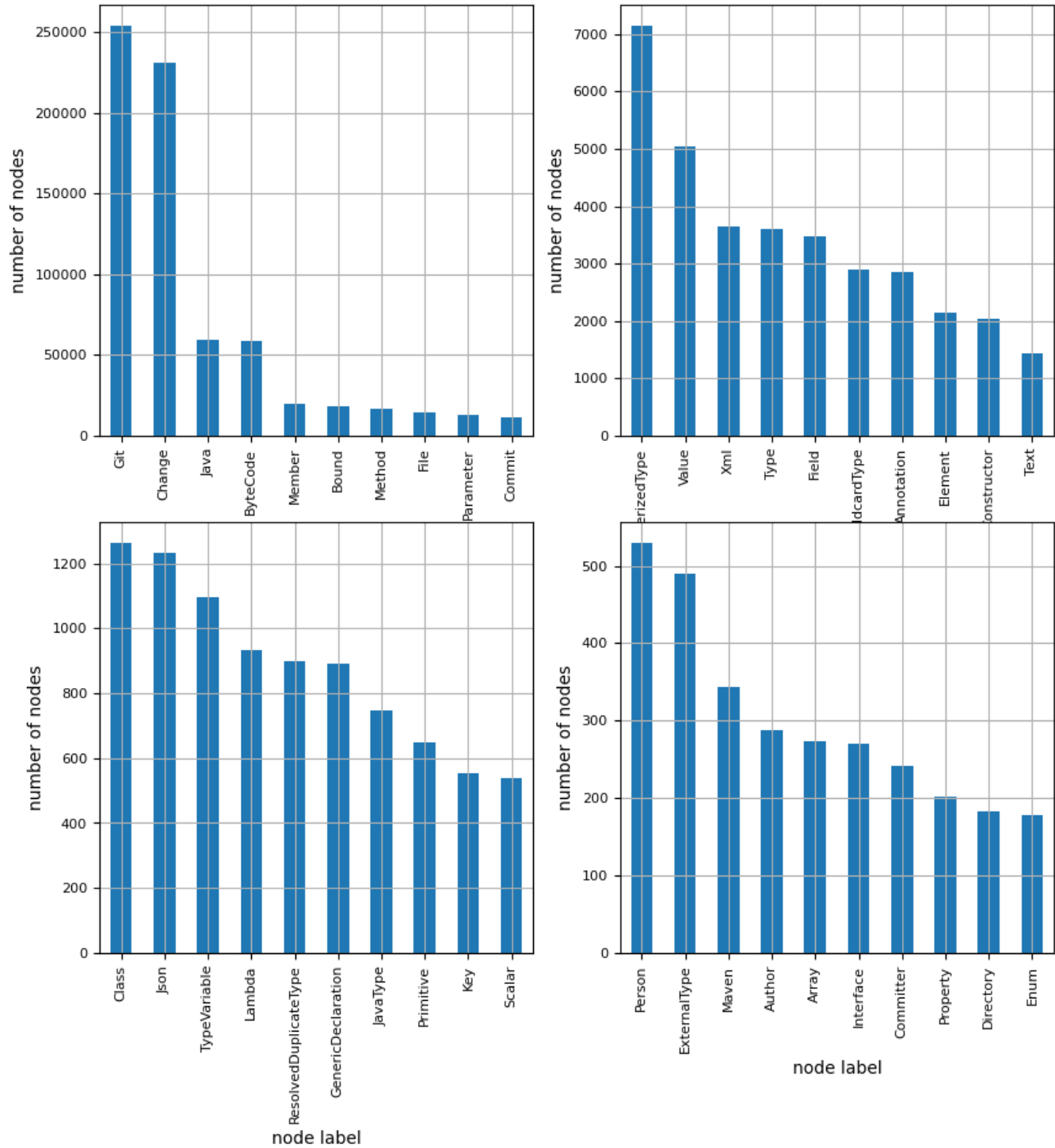
	nodeLabel	nodesWithThatLabel	nodesWithThatLabelPercent
0	Git	254210	79.637728
1	Change	231259	72.447746
2	Java	59130	18.523972
3	ByteCode	58942	18.465076
4	Member	20184	6.323150
5	Bound	18402	5.764893
6	Method	16701	5.232012
7	File	14418	4.516804
8	Parameter	12968	4.062555
9	Commit	11659	3.652477
10	ParameterizedType	7154	2.241172
11	Value	5046	1.580787
12	Xml	3643	1.141262
13	Type	3608	1.130297
14	Field	3483	1.091138
15	WildcardType	2902	0.909125
16	Annotation	2856	0.894714
17	Element	2144	0.671662
18	Constructor	2031	0.636262
19	Text	1436	0.449863
20	Class	1264	0.395980
21	Json	1234	0.386582
22	TypeVariable	1094	0.342723
23	Lambda	931	0.291659
24	ResolvedDuplicateType	899	0.281635
25	GenericDeclaration	892	0.279442
26	JavaType	746	0.233703
27	Primitive	647	0.202689
28	Key	555	0.173868
29	Scalar	539	0.168855
30	Person	530	0.166036
31	ExternalType	489	0.153192
32	Maven	343	0.107453
33	Author	288	0.090223
34	Array	273	0.085524
35	Interface	271	0.084898
36	Committer	242	0.075813
37	Property	202	0.063282
38	Directory	183	0.057329
39	Enum	178	0.055763

Chart 1c - Highest node count by label

Shows the 40 labels with the highest number of nodes.

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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: 967555
```

	relationshipType	nodesWithThatRelationshipType	nodesWithThatRelationshipTypePercent
0	CONTAINS_CHANGE	231259	23.901380
1	MODIFIES	231259	23.901380
2	UPDATES	148166	15.313445
3	CREATES	57605	5.953667
4	INVOKES	35749	3.694777
5	DELETES	35346	3.653126
6	COMMITTED	23318	2.409992
7	DEPENDS_ON	21459	2.217858
8	OF_TYPE	21292	2.200598
9	DECLARES	20623	2.131455
10	OF_RAW_TYPE	17041	1.761244
11	HAS_PARENT	14174	1.464930
12	HAS	14057	1.452837
13	RETURNS	12524	1.294397
14	RENAMES	9858	1.018857
15	READS	9068	0.937208
16	HAS_ACTUAL_TYPE_ARGUMENT	8261	0.853802
17	HAS_NEW_NAME	6161	0.636760
18	OF_GENERIC_TYPE	5892	0.608958
19	RESOLVES_TO	5233	0.540848
20	SIMILAR	3915	0.404628
21	CONTAINS	3797	0.392432
22	WRITES	3796	0.392329
23	RETURNS_GENERIC	3538	0.365664
24	ANNOTATED_BY	2801	0.289493
25	REQUIRES	2172	0.224483
26	HAS_FIRST_CHILD	2144	0.221589
27	HAS_LAST_CHILD	2144	0.221589
28	HAS_ELEMENT	2126	0.219729
29	HAS_UPPER_BOUND	1519	0.156994

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>
```
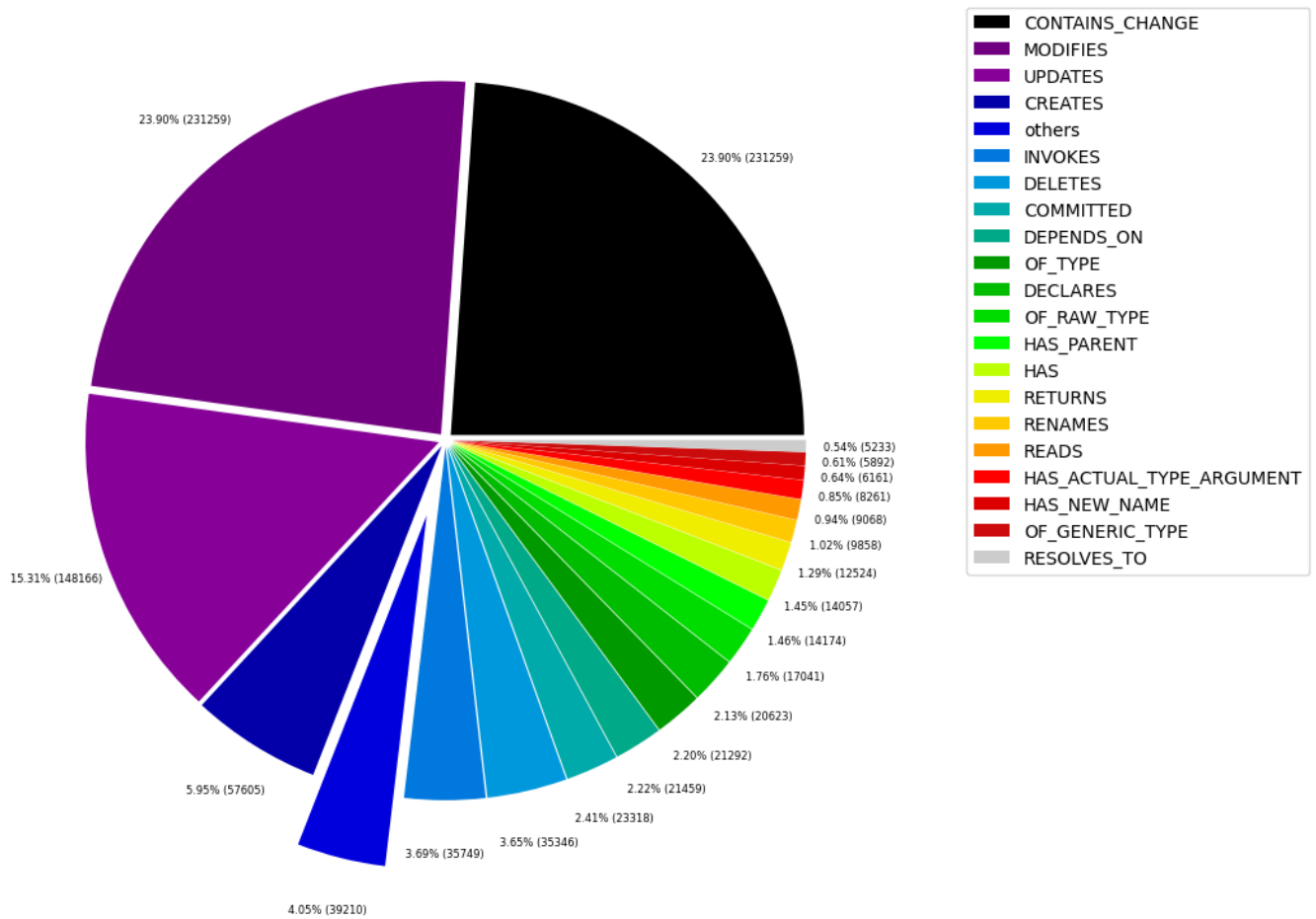
Relationship types (more than 0.5% overall)

Legend:
- CONTAINS_CHANGE
- MODIFIES
- UPDATES
- CREATES
- others
- INVOKES
- DELETES
- COMMITTED
- DEPENDS_ON
- OF_TYPE
- DECLARES
- OF_RAW_TYPE
- HAS_PARENT
- HAS
- RETURNS
- RENAMES
- READS
- HAS_ACTUAL_TYPE_ARGUMENT
- HAS_NEW_NAME
- OF_GENERIC_TYPE
- RESOLVES_TO

Slice labels:
- 23.90% (231259)
- 23.90% (231259)
- 15.31% (148166)
- 5.95% (57605)
- 4.05% (39210)
- 3.69% (35749)
- 3.65% (35346)
- 2.41% (23318)
- 2.22% (21459)
- 2.20% (21292)
- 2.13% (20623)
- 1.76% (17041)
- 1.46% (14174)
- 1.45% (14057)
- 1.29% (12524)
- 1.02% (9858)
- 0.94% (9068)
- 0.85% (8261)
- 0.64% (6161)
- 0.61% (5892)
- 0.54% (5233)

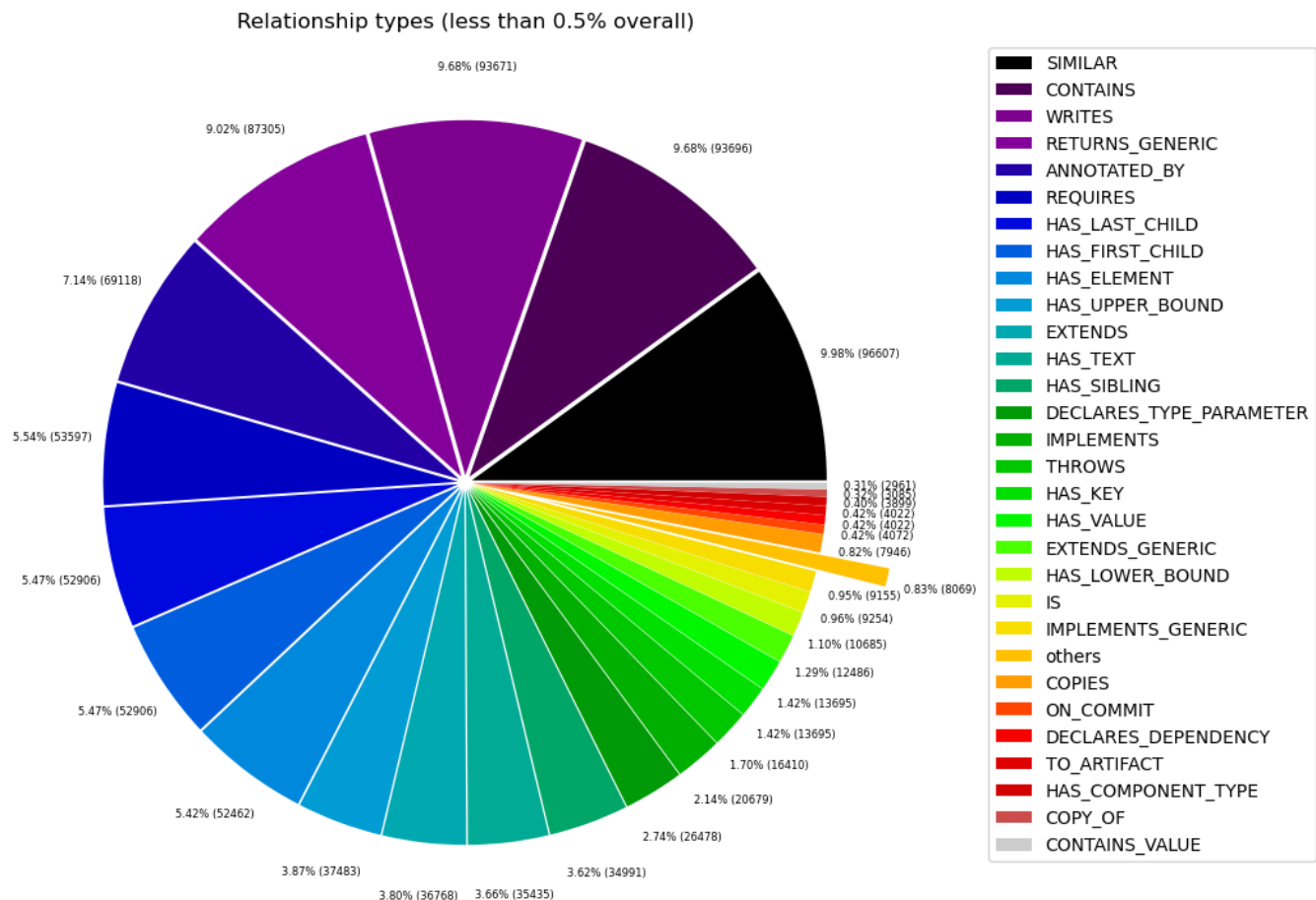## Table 2b - Lowest relationship count by type

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	HAS_PROPERTY	1	0.000103
1	THROWS_GENERIC	5	0.000517
2	EXCLUDES	5	0.000517
3	DESCRIBES	9	0.000930
4	HAS_ROOT_ELEMENT	11	0.001137
5	HAS_GOAL	16	0.001654
6	HAS_EXECUTION	16	0.001654
7	OF_NAMESPACE	18	0.001860
8	HAS_ATTRIBUTE	18	0.001860
9	INCLUDES_CONCEPT	19	0.001964
10	USES_PLUGIN	21	0.002170
11	REQUIRES_TYPE_PARAMETER	21	0.002170
12	IS_ARTIFACT	21	0.002170
13	HAS_CONFIGURATION	21	0.002170
14	HAS_HEAD	25	0.002584
15	REQUIRES_CONCEPT	28	0.002894
16	DECLARES_NAMESPACE	36	0.003721
17	HAS_DEFAULT	36	0.003721
18	CONTAINS_VALUE	120	0.012402
19	COPY_OF	125	0.012919
20	HAS_COMPONENT_TYPE	158	0.016330
21	TO_ARTIFACT	163	0.016847
22	DECLARES_DEPENDENCY	163	0.016847
23	ON_COMMIT	165	0.017053
24	COPIES	322	0.033280
25	IMPLEMENTS_GENERIC	371	0.038344
26	IS	375	0.038757
27	HAS_LOWER_BOUND	433	0.044752
28	EXTENDS_GENERIC	506	0.052297
29	HAS_VALUE	555	0.057361

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:
- SIMILAR
- CONTAINS
- WRITES
- RETURNS_GENERIC
- ANNOTATED_BY
- REQUIRES
- HAS_LAST_CHILD
- HAS_FIRST_CHILD
- HAS_ELEMENT
- HAS_UPPER_BOUND
- EXTENDS
- HAS_TEXT
- HAS_SIBLING
- DECLARES_TYPE_PARAMETER
- IMPLEMENTS
- THROWS
- HAS_KEY
- HAS_VALUE
- EXTENDS_GENERIC
- HAS_LOWER_BOUND
- IS
- IMPLEMENTS_GENERIC
- others
- COPIES
- ON_COMMIT
- DECLARES_DEPENDENCY
- TO_ARTIFACT
- HAS_COMPONENT_TYPE
- COPY_OF
- CONTAINS_VALUE

Pie chart values:
- 9.68% (93671)
- 9.02% (87305)
- 7.14% (69118)
- 5.54% (53597)
- 5.47% (52906)
- 5.47% (52906)
- 5.42% (52462)
- 3.87% (37483)
- 3.80% (36768)
- 3.66% (35435)
- 3.62% (34991)
- 2.74% (26478)
- 2.14% (20679)
- 1.70% (16410)
- 1.42% (13695)
- 1.42% (13695)
- 1.29% (12486)
- 1.10% (10685)
- 0.96% (9254)
- 0.95% (9155)
- 0.83% (8069)
- 0.82% (7946)
- 0.42% (4072)
- 0.42% (4022)
- 0.42% (4022)
- 0.40% (3899)
- 0.32% (3085)
- 0.31% (2961)
- 9.68% (93696)
- 9.98% (96607)

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]	CONTAINS_CHANGE	[Git, Change]	231259	11659	
1	[Git, Change]	MODIFIES	[File, Git]	231259	231259	
2	[Git, Change]	UPDATES	[File, Git]	148166	231259	
3	[Git, Change]	CREATES	[File, Git]	57605	231259	
4	[Git, Change]	DELETES	[File, Git]	35346	231259	
5	[Java, ByteCode, Method, Member]	INVOKES	[Java, ByteCode, Method, Member]	21894	13057	
6	[Git, Commit]	HAS_PARENT	[Git, Commit]	14165	11659	
7	[Author, Git, Person]	COMMITTED	[Git, Commit]	11659	288	
8	[Committer, Git, Person]	COMMITTED	[Git, Commit]	11659	242	
9	[Git, Change]	RENAMES	[File, Git]	9858	231259	
10	[Java, ByteCode, Method, Member]	HAS	[Java, ByteCode, Parameter]	8294	13057	
11	[Java, ByteCode, Method, Member]	READS	[Java, ByteCode, Member, Field]	8125	13057	
12	[Java, ByteCode, Parameter]	OF_TYPE	[Type, File, Java, ByteCode, JavaType]	6335	12968	
13	[File, Git]	HAS_NEW_NAME	[File, Git]	6161	10572	
14	[Java, ByteCode, Bound]	OF_RAW_TYPE	[Type, File, Java, ByteCode, JavaType]	3554	7094	
15	[Java, ByteCode, Bound, ParameterizedType]	OF_RAW_TYPE	[Type, File, Java, ByteCode, JavaType]	3034	7154	
16	[Java, ByteCode, Bound, ParameterizedType]	HAS_ACTUAL_TYPE_ARGUMENT	[Java, ByteCode, Bound, WildcardType]	2902	7154	
17	[Java, ByteCode, Parameter]	OF_GENERIC_TYPE	[Java, ByteCode, Bound, ParameterizedType]	2650	12968	
18	[Java, ByteCode, Bound, ParameterizedType]	HAS_ACTUAL_TYPE_ARGUMENT	[Java, ByteCode, Bound, TypeVariable]	2453	7154	
19	[Java, ByteCode, Constructor, Method, Member]	WRITES	[Java, ByteCode, Member, Field]	2423	2027	
20	[Java, Value, ByteCode, Annotation]	OF_TYPE	[Type, File, Java, ByteCode, ExternalType, Ext...	2336	2813	
21	[Xml, Element]	HAS_ELEMENT	[Xml, Element]	2126	2144	
22	[Java, ByteCode, Constructor, Method, Member]	INVOKES	[Java, ByteCode, Constructor, Method, Member]	2100	2027	
23	[Java, ByteCode, Method, Member]	RETURNS	[Type, File, Java, ByteCode, JavaType]	2088	13057	
24	[Java, ByteCode, Method, Member]	INVOKES	[Java, ByteCode, Constructor, Method, Member]	2034	13057	
25	[Java, ByteCode, Constructor, Method, Member]	HAS	[Java, ByteCode, Parameter]	2021	2027	
26	[Java, ByteCode, Parameter]	OF_GENERIC_TYPE	[Java, ByteCode, Bound]	2020	12968	
27	[Java, ByteCode, Method, Member, Lambda]	INVOKES	[Java, ByteCode, Method, Member]	1865	931	
28	[Java, ByteCode, Bound, ParameterizedType]	HAS_ACTUAL_TYPE_ARGUMENT	[Java, ByteCode, Bound]	1792	7154	
29	[Java, ByteCode, Constructor, Method, Member]	INVOKES	[Java, ByteCode, Method, Member]	1790	2027	

Graph Density

```
total_number_of_nodes (vertices): 319208
total_number_of_relationships (edges): 967555
-> total directed graph density: 9.495754716076858e-06
-> total directed graph density in percent: 0.0009495754716076859
```