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# AUTOMATIC PACKAGE DEPENDENCY ELIMINATION

III

RECALL

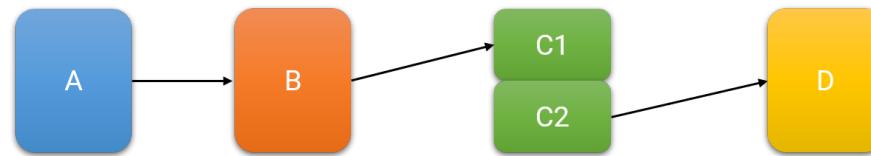
# PROJECT OBJECTIVE

## Problem

- “**Many packages dependencies**” problem is severe in JavaScript development

## Observation

- Some dependencies are essentially **unrequired**



## Goal

- Use program analysis to automatically **detect "fake" dependencies**

# BACKGROUND KNOWLEDGE

## Package Manager: npm / yarn

- Manages dependency installation
- Maintains meta information in `package.json`
- Generates a lock file: `package-lock.json` or `yarn.lock`

## Several JavaScript Module Systems: Complicate static analysis

- CJS: `var someModule = require(flag())? 'A' : 'B'`
- ESM: `import { func } from 'A'`
- ...

Recursively search files for dependencies they use, and store used package in a list



Recursively filter folders in repository root ***node\_modules*** folder to find and prune unused packages

## METHODOLOGY

### Assumptions

- No dynamically generated code
- All imports are static

# ANALYSIS GRANULARITY: FILE-LEVEL

## **Most dead code elimination approaches for static language**

- Operates on procedure level
- Better completeness

## **Difficulty for JavaScript**

- Removing a unused but imported package → Runtime error

## **Compromise**

- Analyze on file-level

# ABSTRACTION

## File Dependency Graph

**Nodes:** files

**Edges:** import statements

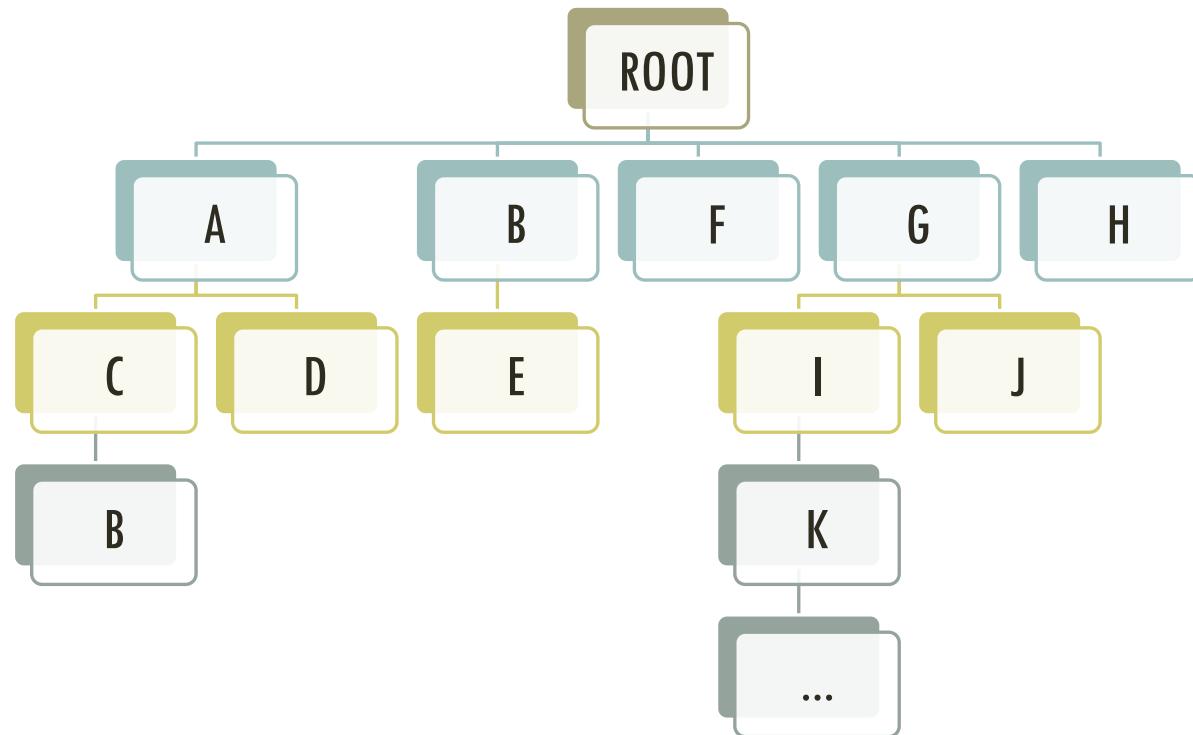
## Package Dependency Graph

**Nodes:** packages

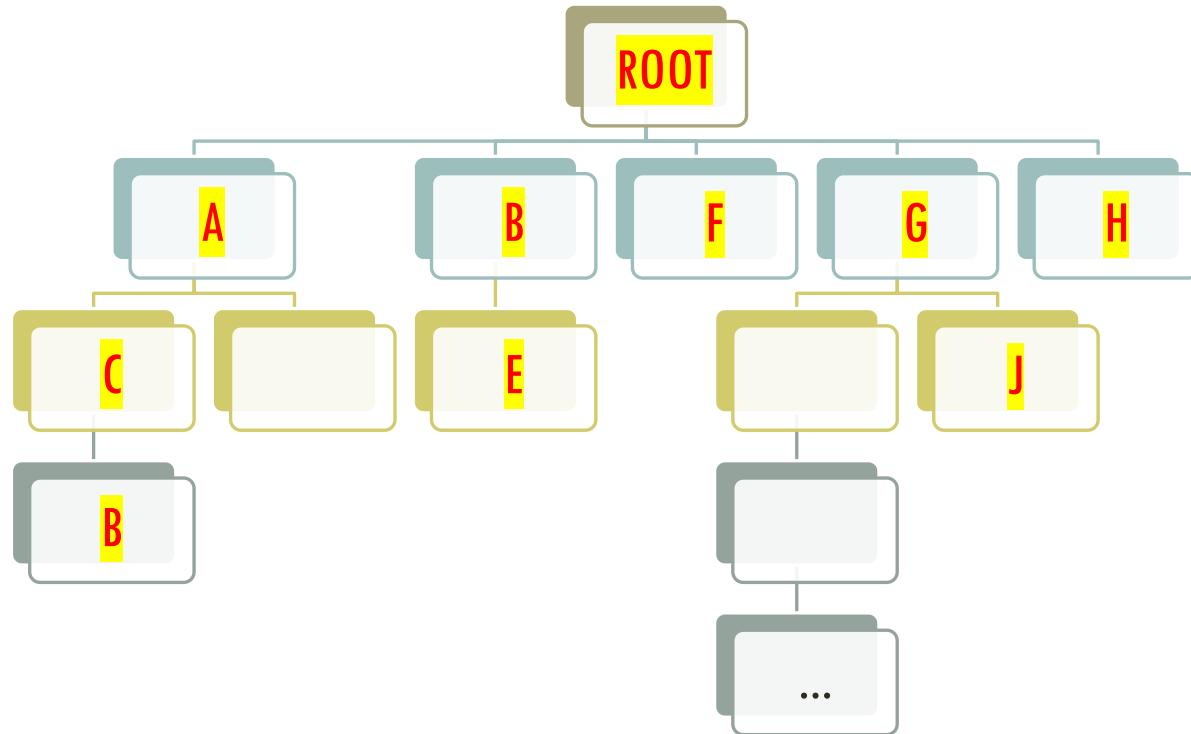
**Edges:**

- say file1 in pkg1, file2 in pkg2
- If file1 → file2, then pkg1 → pkg2

# ABSTRACTION



# ABSTRACTION



# IMPLEMENTATION

# DEPENDENCY-TREE

A npm module that get the dependency tree of a JavaScript module.

We fork the repository and add support for extracting

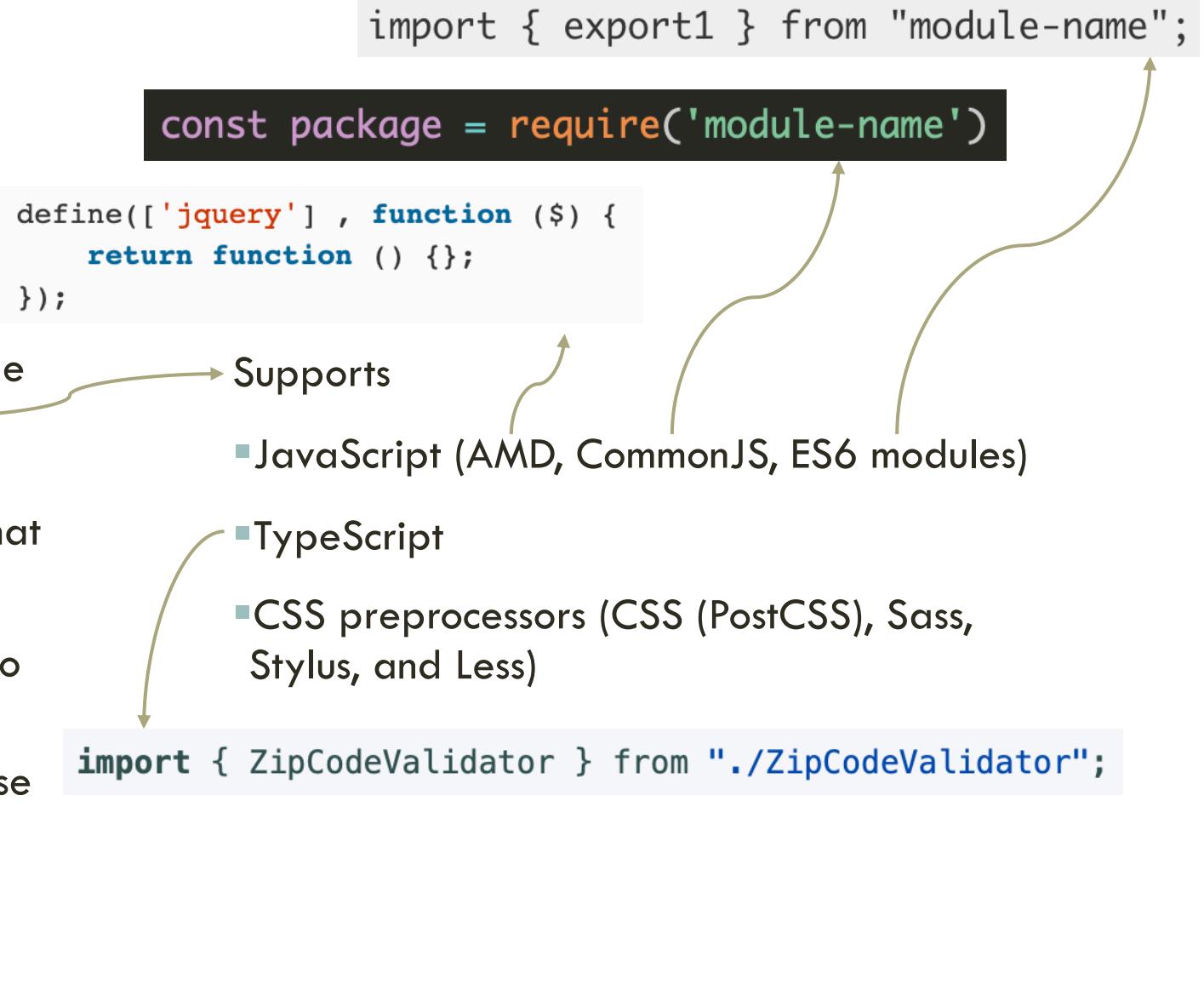
***package-name@semantic-version***

output of a Node.js application

```
[>node index.js
[
  'puppeteer@3.0.2',
  'ms@2.0.0',
  'debug@2.6.9',
  'mime@2.4.4',
  'wrappy@1.0.2',
  'once@1.4.0',
  'end-of-stream@1.4.4',
  'pump@3.0.0',
  'get-stream@5.1.0',
  'pend@1.2.0',
  'fd-slicer@1.1.0',
  'buffer-crc32@0.2.13',
  'yauzl@2.10.0',
  'extract-zip@2.0.0',
  'fs.realpath@1.0.0',
  'concat-map@0.0.1',
  'balanced-match@1.0.0',
  'brace-expansion@1.1.11',
  'minimatch@3.0.4',
  'inherits@2.0.4',
  'path-is-absolute@1.0.1',
  'glob@7.1.6',
```

# DEPENDENCY-TREE

1. **dependency-tree** takes in a starting file and passes to **precinct** to extract dependencies
2. **precinct** uses the AST to determine what type of JS module the file is (CommonJS, AMD, or ES6) and then passes the dependency strings back to **dependency-tree**
3. **dependency-tree** resolves each of those dependencies to a file on the host filesystem via **filing-cabinet**
4. Recursively repeat this process until there is no dependency files left



# DEPENDENCY-TREE

## **getPackageId** function

1. Split absolute file path and get the path to package folder in *node\_modules* folder
2. Check if *package.json* file exists, if not return empty string “ ”
3. Read *package.json* and get the value of [*\_id*] entry and return it

```
224  /**
225   * Get the "_id" value in package.json file of a JavaScript module which is its module name and version
226   *
227   * @param {Config} config
228   * @return {String}
229   */
230  function getPakcageId(config) {
231    const directoryList = config.filename.split(path.sep);
232    while (directoryList.length > 2 && directoryList[directoryList.length - 2] !== 'node_modules') {
233      directoryList.pop();
234    }
235    const pkgPath = directoryList.join(path.sep).concat('/', 'package.json');
236    if (!fs.existsSync(pkgPath)) {
237      debug('package.json does not exist');
238      return '';
239    }
240    const pkgFile = fs.readFileSync(pkgPath);
241    const pkgId = JSON.parse(pkgFile)[ '_id' ];
242    config.pkgId = pkgId;
243    return pkgId;
244 }
```

# DEPENDENCY-TREE

## traverse function

1. Create a new Set **subTree** to store the package names of all dependencies of the current file
2. Call **\_getDependencies** function which essentially uses **precinct** and **filing-cabinet** to identify and locate all dependency files on the host filesystem
3. Call **getPackageId** function to get package names of all the dependencies found
4. Store them into the **subTree** and mark the file as visited

```
150  /**
151  * @param {Config} config
152  * @return {Object|Set}
153  */
154  function traverse(config) {
155    let subTree = config.isListForm || config.isPackageForm ? new Set() : {};
156    debug(`\ntraversing ' + config.filename);
157    if (config.visited[config.filename]) {
158      debug('already visited ' + config.filename);
159      return config.visited[config.filename];
160    }
161    let dependencies = module.exports._getDependencies(config);
162    debug('cabinet-resolved all dependencies: ', dependencies);
163    // Prevents cycles by eagerly marking the current file as read
164    // so that any dependent dependencies exit
165    config.visited[config.filename] = config.isListForm || config.isPackageForm ? [] : {};
166    if (config.filter) {
167    }
168    for (let i = 0, l = dependencies.length; i < l; i++) {
169      const d = dependencies[i];
170      const localConfig = config.clone();
171      localConfig.filename = d;
172      localConfig.pkgId = getPackageId(localConfig);
173      if (localConfig.isListForm) {
174      } else if (localConfig.isPackageForm) {
175        for (let item of traverse(localConfig)) {
176          subTree.add(item);
177        }
178      } else {
179      }
180    }
181    if (config.isListForm) {
182    } else if (config.isPackageForm) {
183      subTree.add(config.pkgId);
184      config.visited[config.filename].push(...subTree);
185    } else {
186    }
187  }
188  return subTree;
189}
```

# SEEK REAL DEPENDENCIES IMPLEMENTATION

```
/**  
 * Get the name of the package whose files are used  
 *  
 * @param {Config} config  
 * @return {String} absolute path to the package  
 */  
  
function getPakcageId(config) {  
  const directoryList = config.filename.split(path.sep);  
  if (directoryList.includes('node_modules')) {  
    while (directoryList.length > 0 && directoryList[directoryList.length - 1] !== 'node_modules') {  
      const pkgPath = directoryList.join(path.sep).concat(path.sep, 'package.json');  
      if (fs.existsSync(pkgPath)) {  
        return directoryList.join(path.sep);  
      }  
      directoryList.pop();  
    }  
  }  
  debug('package.json does not exist');  
  return '';  
}
```

```
class Config {  
  constructor(options) {  
    this.filename = options.filename;  
    this.directory = options.directory || options.root;  
    this.pkgId = options.pkgId;  
    this.visited = options.visited || {};  
    this.nonExistent = options.nonExistent || [];  
    this.isListForm = options.isListForm;  
    this.isPackageForm = options.isPackageForm;  
    this.requireConfig = options.config || options.requireConfig;  
    this.webpackConfig = options.webpackConfig;  
    this.nodeModulesConfig = options.nodeModulesConfig;  
    this.detectiveConfig = options.detective || options.detectiveConfig || {};  
    this.tsConfig = options.tsConfig;  
  
    this.filter = options.filter;
```

# FILTER UNUSED PACKAGES IMPLEMENTATION

```
const traverse = (currentDir) => {
  console.log(colors.magenta.bold('\nNew directory'), currentDir);
  const dirSegments = currentDir.split(Path.sep);
  fs.readdir(currentDir, { withFileTypes: true }, function (err, dirents) {
    if (err) throw err;
  }

  let entPath = currentDir.concat(Path.sep, dirent.name);

  if (isUnixHiddenPath(entPath)) {
    console.log(entPath, "Hidden path".yellow.bold);
    continue;
  }

  if (isCollectionFolder(entPath)) {
    console.log(entPath, "Collection path".yellow.bold);
    continue;
  }

  // check for redundant package
  if (dirSegments[dirSegments.length - 1] == 'node_modules' && !realDeps.includes(`\".concat(entPath, '\"')) {
    console.log(entPath.red, colors.bgBlue.red.bold('Redundant package'));
    deleteFolderRecursive(entPath);
    continue;
  }
}

const isUnixHiddenPath = (path) => {
  return /(^\//).[^/\.]/g.test(path);
}

const isCollectionFolder = (path) => {
  return /(^\//)@[^\//]/g.test(path);
```

# EVALUATION PROCEDURE

Search

Recursively search files for dependencies they use, and store used package in a list

Prune

Recursively filter folders in repository root node\_modules folder to find and prune unused packages

Test

Rerun tests in pruned projects to validate completeness

DATA SET FOR  
EVALUATION

# EXPERIMENT DESIGN

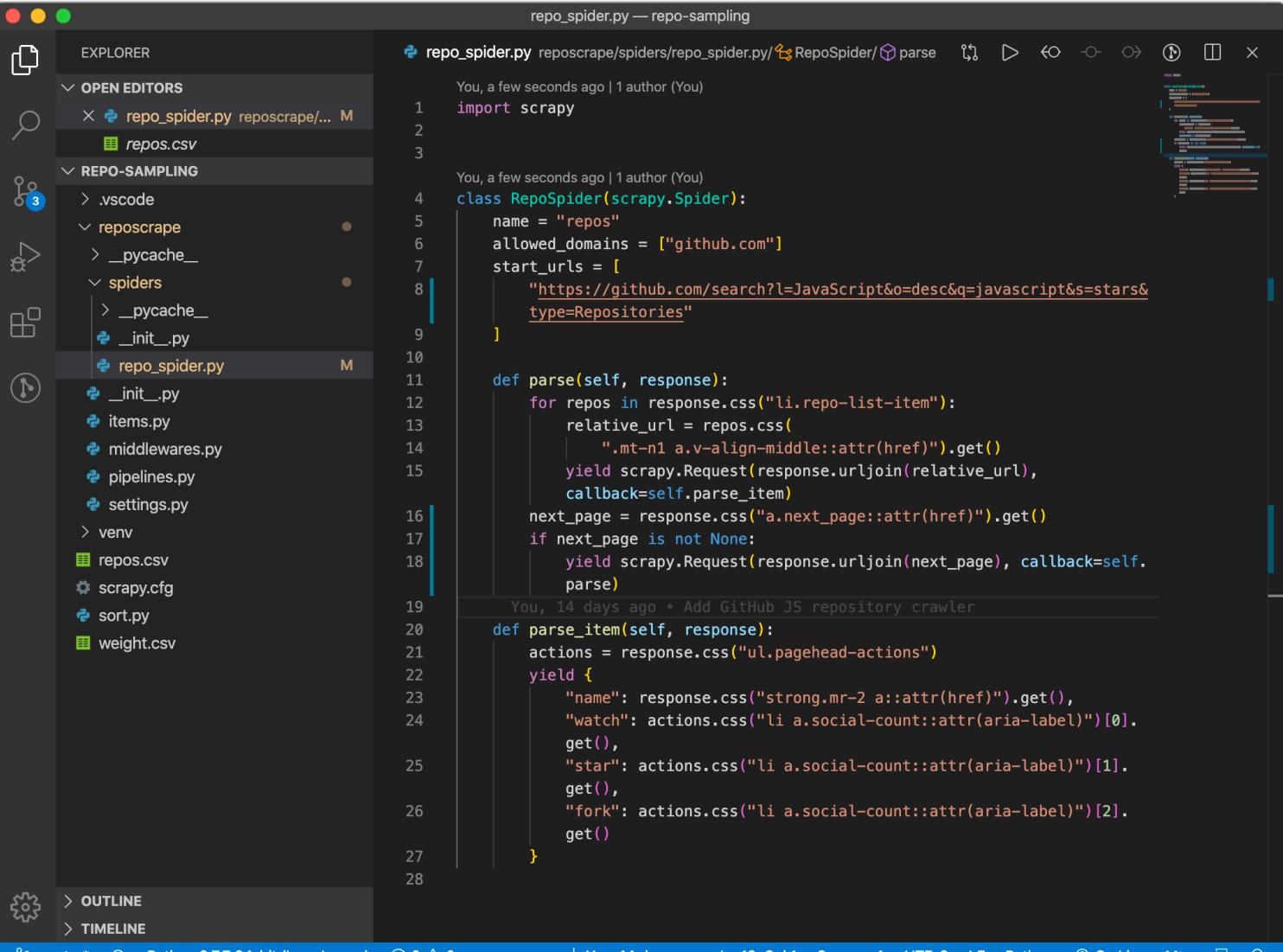
- Goal: test our algorithm on typical JavaScript projects to see if the program would crash after pruning.
  - Sample JavaScript projects
  - Generate/reuse tests
- Sample JavaScript projects
  - Python Scrapy library
  - 920 GitHub repositories scraped and sorted by weights
  - Top 15 repositories selected for algorithm test
- Generate/reuse projects
  - Project-specific

Metric	Role	Description	Weight
watch	Subscribers, passive relating	keep up with news and modifications	2
star	Collectors, proactive relating	add to one's own collections for quick search	3
fork	Colaborators, proactive participating	participate in the development of the project	4

weight = watch \*2 + star \*3 + fork \*4

# SCRAPY SPIDER

- Start from `start_urls`
- Traverse through the list of repository items
  - Go to repository page and extract repository name, watch count, star count, and fork count
- Get the url of `next_page` button and resolve to url of the next page
  - Send request to go to the next page until there is no page left



The screenshot shows the VS Code interface with the following details:

- Explorer View:** Shows the project structure. The current folder is "REPO-SAMPLING". Other files visible include .vscode, reposcrape, spiders, .init\_.py, and weight.csv.
- Code Editor:** The file "repo\_spider.py" is open. The code defines a spider named "RepoSpider" that scrapes GitHub for JavaScript repositories. It uses CSS selectors to extract repository names, watch counts, star counts, and fork counts. It also handles pagination by following the "next\_page" link.
- Status Bar:** Shows the file is "master\*", using Python 3.7.7 64-bit ('venv': venv), and the current line is Ln 19, Col 1.
- Bottom Bar:** Includes icons for Go Live, kite, and other development tools.

```
repo_spider.py — repo-sampling

You, a few seconds ago | 1 author (You)
import scrapy

You, a few seconds ago | 1 author (You)
class RepoSpider(scrapy.Spider):
    name = "repos"
    allowed_domains = ["github.com"]
    start_urls = [
        "https://github.com/search?l=JavaScript&o=desc&q=javascript&s=stars&type=Repositories"
    ]

    def parse(self, response):
        for repos in response.css("li.repo-list-item"):
            relative_url = repos.css(
                ".mt-n1 a.v-align-middle::attr(href)").get()
            yield scrapy.Request(response.urljoin(relative_url),
                                 callback=self.parse_item)
        next_page = response.css("a.next_page::attr(href)").get()
        if next_page is not None:
            yield scrapy.Request(response.urljoin(next_page), callback=self.parse)

    You, 14 days ago • Add GitHub JS repository crawler
    def parse_item(self, response):
        actions = response.css("ul.pagehead-actions")
        yield {
            "name": response.css("strong.mr-2 a::attr(href)").get(),
            "watch": actions.css("li a.social-count::attr(aria-label)") [0].get(),
            "star": actions.css("li a.social-count::attr(aria-label)") [1].get(),
            "fork": actions.css("li a.social-count::attr(aria-label)") [2].get()
        }
```

	name	watch	star	fork		watch (normalized)	star (normalized)	fork (normalized)		weight	weight (normalized)
1	/twbs/bootstrap	7145	140024	68615		0.045292898	0.032378508	0.078413289		0.51428887	0.057143208
2	/freeCodeCamp/freeCodeCamp	8395	309944	23919		0.053216778	0.071670031	0.027334657		0.41232902	0.045814336
4	/facebook/react	6646	147007	28419		0.042129685	0.033993225	0.032477261		0.32428455	0.036031617
5	/vuejs/vue	6121	161779	24481		0.038801656	0.037409035	0.027976911		0.30313068	0.033681187
6	/airbnb/javascript	3556	94520	18412		0.022541854	0.021856372	0.021041252		0.19550331	0.02172259
7	/mrdoob/three.js	2468	59767	23099		0.015644909	0.013820247	0.02639756		0.18016546	0.020018384
8	/jquery/jquery	3414	53169	19231		0.021641701	0.012294556	0.021977206		0.17742304	0.019713671
9	/nodejs/node	2926	69168	16676		0.018548218	0.015994091	0.019057349		0.16386223	0.018206915
10	/atom/atom	2493	51674	14351		0.015803386	0.011948859	0.016400337		0.13690922	0.015212136
11	/trekhleb/javascript-algorithms	2690	67804	11211		0.01705219	0.015678686	0.012811942		0.13376171	0.014862412
12	/mui-org/material-ui	1331	56410	15491		0.008437347	0.01304399	0.01770313		0.12221254	0.013579171
13	/h5bp/html5-boilerplate	2614	44604	10680		0.016570418	0.010314025	0.012205114		0.11915976	0.013239973
14	/chartjs/Chart.js	1455	48155	10287		0.009223396	0.011135142	0.011755994		0.09696445	0.010773827
15	/expressjs/express	1827	48157	8066		0.011581543	0.011135604	0.009217833		0.09388717	0.010431908
16	/webpack/webpack	1626	53794	6944		0.010307383	0.012439078	0.00793561		0.08754275	0.009726972
17	/30-seconds/30-seconds-of-code	1728	55837	6203		0.010953972	0.012911492	0.007088794		0.08704008	0.00967112
18	/axios/axios	1175	71959	6450		0.007448447	0.01663947	0.007371066		0.08510855	0.009456505
19	/meteor/meteor	1758	41710	5133		0.011144145	0.009644829	0.005865997		0.07618608	0.00846512
20	/adobe/brackets	1587	31197	6633		0.010060158	0.007213851	0.007580199		0.07492897	0.008325441
21	/moment/moment	944	43735	6571		0.005984114	0.010113081	0.007509345		0.06821589	0.007579543
22	/mozilla/pdf.js	1035	30242	7130		0.006560973	0.006993022	0.008148171		0.06626165	0.007362405
23	/goldbergonyi/nodebestpractices	1321	42912	3849		0.008373956	0.009922774	0.004398641		0.06256198	0.006951331
24	/lodash/lodash	867	44317	4826		0.005496003	0.01024766	0.005515158		0.05904396	0.00656044
25	/ryanmcdermott/clean-code-javascript	1164	35065	4100		0.007378717	0.00810827	0.004685484		0.05709463	0.006343847
26	/jashkenas/underscore	923	25277	5504		0.005850993	0.005844938	0.006289977		0.05440276	0.006044751
27	/select2/select2	774	24363	5929		0.004906467	0.005633589	0.006775667		0.05308924	0.005898805
28	/babel/babel	874	36308	4218		0.005540377	0.008395696	0.004820335		0.05269386	0.005854873
29	/Leaflet/Leaflet	959	27585	4458		0.006079201	0.006378629	0.005094607		0.05137329	0.005708143
30	/alsotang/node-lessons	1127	15642	4796		0.00714417	0.003616984	0.005480874		0.05058997	0.005621108
31	/leonardomso/33-js-concepts	1041	31509	3485		0.006599007	0.007285997	0.003982661		0.05029966	0.005588851
32	/hexojs/hexo	862	30127	3890		0.005464308	0.006966429	0.004445496		0.04810777	0.005345307
33	/emberjs/ember.js	992	21430	4217		0.006288391	0.004955375	0.004819192		0.04805269	0.005339188

# SELECTED REPOSITORIES

The selected 15 repositories have weight values greater than 98.37% of all repositories scraped.

Average values

- Watch: 171.46847826086957
- Star: 4700.648913043478
- Fork: 951.133695652174

Project excerpt

No.	Repository	Watch	Star	Fork	Weight
1	<a href="#">freeCodeCamp/freeCodeCamp</a>	8395	309944 (1st overall)	23919 (4th overall)	1042298
2	<a href="#">twbs/bootstrap</a>	7145	140024 (4th overall)	68615 (1st overall)	708822
3	<a href="#">vuejs/vue</a>	6121	161779 (2nd overall)	24481 (3rd overall)	595503
4	<a href="#">facebook/react</a>	6646	147007 (3rd overall)	28419 (2nd overall)	567989
5	<a href="#">airbnb/javascript</a>	3556	94520 (5th overall)	18412 (7th overall)	364320
6	<a href="#">nodejs/node</a>	2926	69168 (7th overall)	16676 (8th overall)	280060
7	<a href="#">mrdoob/three.js</a>	2468	59767 (9th overall)	23099 (5th overall)	276633
8	<a href="#">trekhleb/javascript-algorithms</a>	2690	67804 (8th overall)	11211	253636
9	<a href="#">axios/axios</a>	1175	71959 (6th overall)	6450	244027
10	<a href="#">jquery/jquery</a>	3414	53169	19231 (6th overall)	243259
11	<a href="#">mui-org/material-ui</a>	1331	56410 (10th overall)	15491 (9th overall)	233856
12	<a href="#">atom/atom</a>	2493	51674	14351 (10th overall)	217412
13	<a href="#">30-seconds/30-seconds-of-code</a>	1728	55837	6203	195779
14	<a href="#">webpack/webpack</a>	1626	53794	6944	192410
15	<a href="#">chartjs/Chart.js</a>	1455	48155	10287	188523 (>98.37%)

Nodejs does not have dependencies and package-lock.json file, thus is not applicable to the pruning algorithm.

Validate that the  
pruning algorithm  
won't break the  
project

# EVALUATION

# AXIOS/AXIOS

- Behavior driven test, asynchronous test
- Testing framework: Jasmine, Mocha
- 9 unused packages found and pruned

```
deptree — ajunda@Alans-MacBook-Pro — ..lysis/deptree — -zsh
New directory /Users/ajunda/Documents/CS319 Innovative Experiments/Package-Dependency-Scaling-Analysis/axios/node_modules/istanbul/node_modules/resolve/test/pathfilter深深_ref/node_modules/deep
/Users/ajunda/Documents/CS319 Innovative Experiments/Package-Dependency-Scaling-Analysis/axios/node_modules/istanbul/node_modules/resolve/test/resolver/bar/node_modules/foo Redundant package
/Users/ajunda/Documents/CS319 Innovative Experiments/Package-Dependency-Scaling-Analysis/axios/node_modules/istanbul/node_modules/resolve/test/resolver/biz/node_modules/garply
/Users/ajunda/Documents/CS319 Innovative Experiments/Package-Dependency-Scaling-Analysis/axios/node_modules/istanbul/node_modules/resolve/test/resolver/biz/node_modules/grux Redundant package
/Users/ajunda/Documents/CS319 Innovative Experiments/Package-Dependency-Scaling-Analysis/axios/node_modules/istanbul/node_modules/resolve/test/resolver/biz/node_modules/tiv Redundant package

New directory /Users/ajunda/Documents/CS319 Innovative Experiments/Package-Dependency-Scaling-Analysis/axios/node_modules/istanbul/node_modules/resolve/test/resolver/biz/node_modules/garply
/Users/ajunda/Documents/CS319 Innovative Experiments/Package-Dependency-Scaling-Analysis/axios/node_modules/istanbul/node_modules/resolve/test/resolver/punycode/node_modules/punycode Redundant package
/Users/ajunda/Documents/CS319 Innovative Experiments/Package-Dependency-Scaling-Analysis/axios/node_modules/istanbul/node_modules/resolve/test/subdirs/node_mod
```

```
Package-Dependency-Scaling-Analysis — ajunda@Alans-MacBook-Pro — ..li...
.

.

.

Chrome 83.0.4103 (Mac OS X 10.15.5): Executed 244 of 244 SUCCESS (3.627 secs / 3.521 secs)
TOTAL: 732 SUCCESS

Running "ts:test" (ts) task
Compiling...
Cleared fast compile cache for target: test
Using tsc v2.9.2

TypeScript compilation complete: 1.61s for 1 TypeScript files.

Done.
PASS ./dist/axios.min.js: 4.6KB (gzip)

axios on ✘ master [!] is 📦 v0.19.2 via ● v12.16.3 took 35s
```

# VUEJS/VUE

- End-to-end test
  - Testing framework: Nightwatch
  - 4 unused dependencies found and pruned

```
deptree — aijunda@Alans-MacBook-Pro — ..lysis/deptree — -zsh
New directory /Users/aijunda/Projects/CS319-Package-Dependency-Analysis/vue/node_modules/selenium webdriver/lib/test/data/js/themes/modern
/Users/aijunda/Projects/CS319-Package-Dependency-Analysis/vue/node_modules/find-node-modules/test/b/c/d/e/f/node_modules

New directory /Users/aijunda/Projects/CS319-Package-Dependency-Analysis/vue/node_modules/find-node-modules/test/b/c/d/e/f/node_modules
/Users/aijunda/Projects/CS319-Package-Dependency-Analysis/vue/node_modules/istanbul/node_modules/resolve/test/pathfilter深深_ref/node_modules深深

New directory /Users/aijunda/Projects/CS319-Package-Dependency-Analysis/vue/node_modules/istanbul/node_modules/resolve/test/pathfilter深深_ref/node_modules深深
/Users/aijunda/Projects/CS319-Package-Dependency-Analysis/vue/node_modules/istanbul/node_modules/resolve/test/resolver/bar/node_modules/foo Redundant package
/Users/aijunda/Projects/CS319-Package-Dependency-Analysis/vue/node_modules/istanbul/node_modules/resolve/test/resolver/biz/node_modules/garply
/Users/aijunda/Projects/CS319-Package-Dependency-Analysis/vue/node_modules/istanbul/node_modules/resolve/test/resolver/biz/node_modules/grux Redundant package
/Users/aijunda/Projects/CS319-Package-Dependency-Analysis/vue/node_modules/istanbul/node_modules/resolve/test/resolver/biz/node_modules/tiv Redundant package

New directory /Users/aijunda/Projects/CS319-Package-Dependency-Analysis/vue/node_modules/istanbul/node_modules/resolve/test/resolver/biz/node_modules/garply
```

# TWBS/BOOTSTRAP

- Unit test
- Testing framework: Jasmine
- 2 unused package found and pruned

```
deptree — aijunda@Alans-MacBook-Pro — ..lysis/deptree — -zsh
New directory /Users/aijunda/Projects/CS319-Package-Dependency-Analysis/bootstrap-master/node_modules/resolve/test/resolver/same_names/foo
/Users/aijunda/Projects/CS319-Package-Dependency-Analysis/bootstrap-master/node_modules/resolve/test/resolver/symlinked/_/
/Users/aijunda/Projects/CS319-Package-Dependency-Analysis/bootstrap-master/node_modules/resolve/test/resolver/symlinked/package

New directory /Users/aijunda/Projects/CS319-Package-Dependency-Analysis/bootstrap-master/node_modules/resolve/test/resolver/symlinked/_/

New directory /Users/aijunda/Projects/CS319-Package-Dependency-Analysis/bootstrap-master/node_modules/resolve/test/resolver/symlinked/package
/Users/aijunda/Projects/CS319-Package-Dependency-Analysis/bootstrap-master/node_modules/resolve/test/shadowed_core/node_modules/util Redundant package
/Users/aijunda/Projects/CS319-Package-Dependency-Analysis/bootstrap-master/node_modules/rxjs/src/add/observable/dom

New directory /Users/aijunda/Projects/CS319-Package-Dependency-Analysis/bootstrap-master/node_modules/rxjs/src/add/observable/dom
/Users/aijunda/Projects/CS319-Package-Dependency-Analysis/bootstrap-master/node_modules/rxjs/src/internal/observable/dom

New directory /Users/aijunda/Projects/CS319-Package-Dependency-Analysis/bootstrap-master/node_modules/rxjs/src/internal/observable/dom
```

```
bootstrap-master — aijunda@Alans-MacBook-Pro — ..tstrap-master — -zsh
Total in 3006 ms

> bootstrap@5.0.0-alpha1 docs-lint /Users/aijunda/Projects/CS319-Package-Dependency-Analysis/bootstrap-master
> npm-run-all --parallel docs-vnu docs-linkinator

> bootstrap@5.0.0-alpha1 docs-linkinator /Users/aijunda/Projects/CS319-Package-Dependency-Analysis/bootstrap-master
> linkinator _gh_pages --recurse --silent --skip "^(?!\http://localhost)"

> bootstrap@5.0.0-alpha1 docs-vnu /Users/aijunda/Projects/CS319-Package-Dependency-Analysis/bootstrap-master
> node build/vnu-jar.js

Successfully scanned 514 links in 3.985 seconds.

Projects/CS319-Package-Dependency-Analysis/bootstrap-master is v5.0.0-alpha1
via ● v12.16.3 via v7.3.11 took 1m 25s
>_
```

# SUMMARY

Repository	Pruned dependencies
axios/axios	9
vuejs/vue	4
twbs/bootstrap	2
airbnb/javascript	0

# REFERENCE

- <https://docs.npmjs.com/files/package.json>
- <https://classic.yarnpkg.com/en/docs/dependency-types/>
- <https://blog.domenic.me/peer-dependencies/>
- <https://github.com/Alan052918/node-dependency-tree>