

DeepRelease: 一种语言无关的发布说明自动生成方法

Huaxi Jiang, Jie Zhu, Li Yang*, Geng Liang, Chun Zuo
Asia-Pacific Software Engineering Conference (APSEC), 2021, pp. 101-110

联系方式: 杨立 yangli2017@iscas.ac.cn 010-62661198

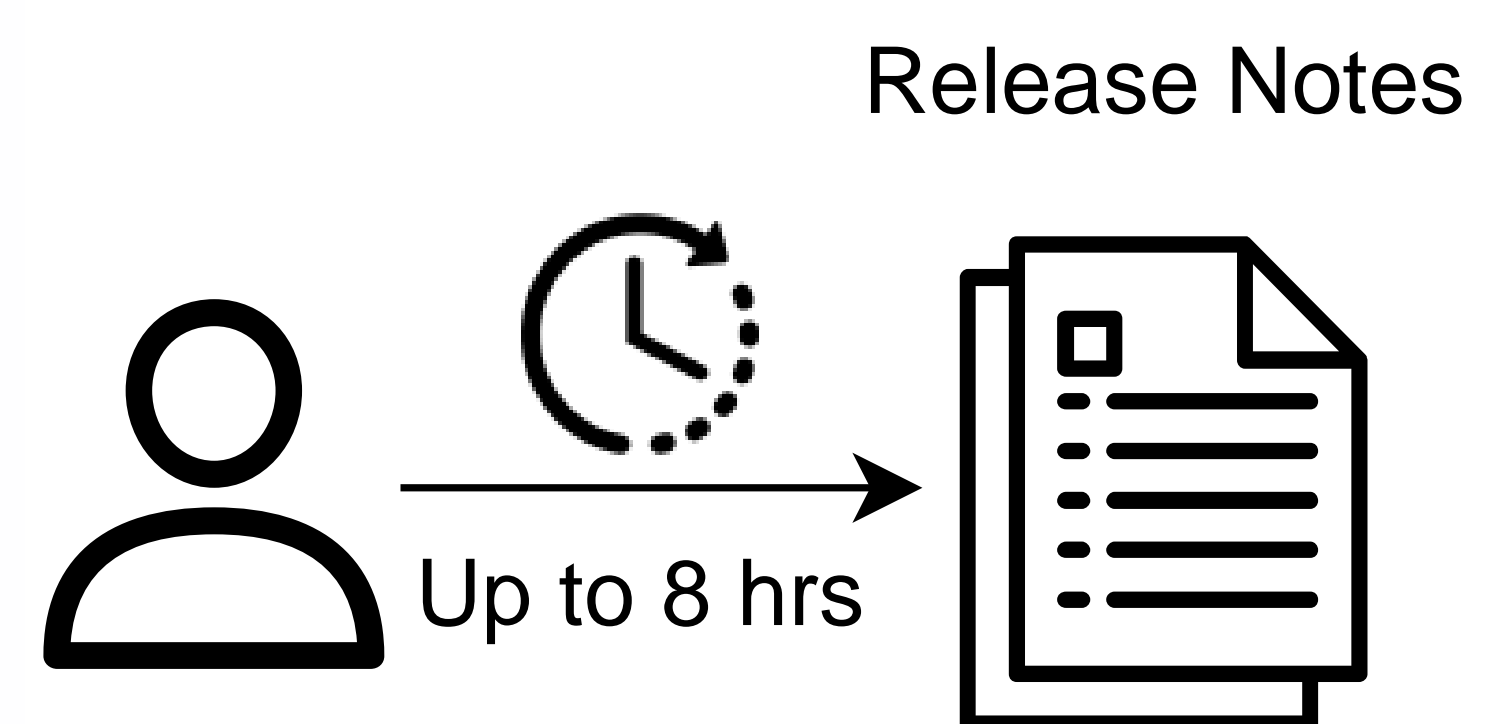
Background

- When open-source software is released, it is usually accompanied by a **release note**
- It summarizes the primary changes, such as new features and bug fixes

Release Notes for v11.4.0	
Features	<ul style="list-style-type: none"> Added support for the des-ede3 cipher in node crypto. #27993 (Also in 12)
Fixes	<ul style="list-style-type: none"> Colors returned from <code>systemPreferences.getAccentColor()</code>, <code>getSystemColor</code> and <code>getColor</code> are now correctly converted into the devices color space. Previously the color would have been subtly incorrect. #28171 (Also in 12, 13) Fixed a potential crash when resetting <code>BrowserView.s</code>. #27948 (Also in 10, 12) Fixed an issue where <code>BrowserView.s</code> could have mismatched draggable regions to their bounds. #27987 (Also in 10, 12) Fixed an issue where <code>win.capturePage()</code> never called back after calling <code>hide()</code> for a hidden window on some platforms. #28074 (Also in 12, 13) Fixed an issue where <code>libuv</code> might hang with multiple subframes when <code>nodeIntegrationInSubframes</code> is enabled. #27880 (Also in 10, 12) Fixed an out-of-bounds access in <code>WebContents.sendInputEvent</code>. #27853 (Also in 10, 12) Fixed background color not being applied for child windows created by native window open path. #27944 (Also in 10, 12) Fixed crash when calling <code>getBackgroundColor</code> on a transparent window with no assigned background color. #28186 (Also in 12, 13) Fixed native window.open() to not use <code>windowName/frameName</code> as title by default. #27813 (Also in 10, 12) Fixed navigator.bluetooth.requestDevice crash. #27941 (Also in 12) Fixed warning when <code>worldSafeExecuteJavaScript</code> is disabled. #27968 (Also in 10, 12)

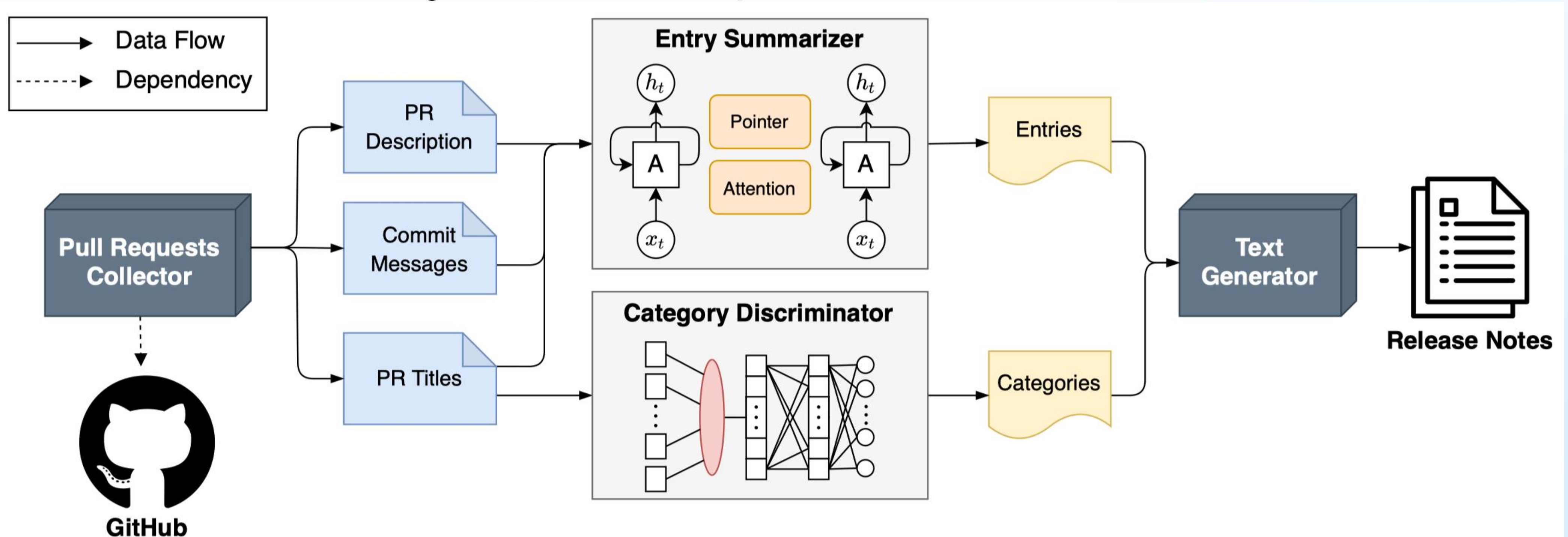
Motivation

- It's a daunting and **time-consuming** job to produce release notes
- Existing methods are language-specific and **not generic enough**



Approach: DeepRelease

- Pull Requests Collector:** retrieve and preprocess PRs
- Entry Summarizer:** summarize entries, pointer-generator network based
- Category Discriminator:** decide the change category, FastText based
- Text Generator:** organize and output the release note



Evaluation

- RQ1: Performance**
 - DeepRelease **can generate release notes similar to those manually written ones**
- RQ2: Language-agnostic**
 - DeepRelease **can be used for projects in any programming language** without additional engineering effort
- RQ3: Effectiveness**
 - DeepRelease can generate an entry and its change category in an average of **29 ms**

TABLE III
COMPARISONS OF OUR APPROACH WITH EACH BASELINE FOR THE ENTRY SUMMARIZATION TASK.

Approach	ROUGE-1			ROUGE-2			ROUGE-L		
	P	R	F1	P	R	F1	P	R	F1
LeadCM	48.23	56.01	49.28	36.36	44.80	37.85	48.71	56.62	50.17
PR-Title	71.26	71.80	69.73	60.20	63.45	60.44	70.49	72.31	69.88
DeepRelease	77.38	71.97	73.21	66.54	63.62	64.21	76.94	72.40	73.51
Ours vs LeadCM	60.44%	28.49%	48.56%	83.00%	42.01%	69.64%	57.96%	27.87%	46.52%
Ours vs PR-Title	8.59%	0.24%	4.99%	10.53%	0.27%	6.24%	9.15%	0.12%	5.19%

TABLE IV
COMPARISONS OF OUR APPROACH WITH EACH BASELINE FOR THE CATEGORY CLASSIFICATION TASK.

Category	Quantity	Precision			Recall			F1		
		RG	Keywords	DeepRelease	RG	Keywords	DeepRelease	RG	Keywords	DeepRelease
Issues fixed	18564	10.62	57.29	80.19	10.50	20.04	78.87	10.56	29.69	79.52
Non-functional	8481	48.02	59.57	86.69	47.95	90.34	89.38	47.98	71.80	88.01
New features	7311	19.34	45.11	78.81	19.00	46.08	86.29	19.17	45.59	82.38
Documentation	4209	21.30	44.10	74.78	21.82	6.64	63.74	21.55	11.54	68.82

Note: Quantity is the number of each category in the entire dataset.

Language	ARENA	Ali's	DeepRelease
C	-	-	✓
Python	-	-	✓
Java	✓	-	✓
C++	-	-	✓
C#	-	-	✓
JavaScript	-	✓	✓
PHP	-	-	✓
Ruby	-	-	✓
Go	-	-	✓