



Descriptive to Prescriptive Analytics and Beyond for Developer Productivity

DPE Summit 2022

Developer Productivity and Happiness

"The purpose
of computing
is insights
not numbers."

Hamming, 1962



Grant Jenks
Senior Staff SWE



Shailesh Jannu
Senior Staff AI/ML

LinkedIn Engineering

Scale of developer productivity at LinkedIn (approximate numbers).

Thousands Engineers

10K+ Repositories

10M+ Builds

10M+ CI Jobs

100M+ SLOC

100K+ Merges

100M+ Artifacts

1M+ Deployments

How we SEE Developer Productivity

SPACE, DORA, QUANTS, etc.



Happy

How satisfied?

Qualitative



Effective

Success rate?

Quantitative



Efficient

How long?

Quantitative

Gradle Build Download Speed (Higher is Better)



CSAT ANALYSIS

Response count >= 5

FY23 Q1 ▾

Organization: ▾

Persona ▾

Top Highlights ⓘ

> [redacted]	4.60	▲ +29.9% (+1.06)
> [redacted]	4.52 ⓘ	▲ +0.4% (+0.02)
> [redacted]	4.39	▲ +8.4% (+0.34)
> [redacted]	4.38	▲ +5.8% (+0.24)
> [redacted]	4.32	▲ +20.3% (+0.73)

Top Painpoints ⓘ

> [redacted]	2.50	▼ -40.6% (-1.71) ⓘ
> [redacted]	2.57	▲ +7.1% (+0.17)
> [redacted]	2.60	▲ +7.0% (+0.17)
> [redacted]	2.64	▼ -9.0% (-0.26)
> [redacted]	2.67	▼ -19.1% (-0.63)

Top Movers ⓘ

> [redacted]	2.50	▼ -40.6% (-1.71) ⓘ
> [redacted]	4.60	▲ +29.9% (+1.06)
> [redacted]	4.32	▲ +20.3% (+0.73)
> [redacted]	2.67	▼ -19.1% (-0.63)
> [redacted]	2.83	▲ +18.9% (+0.45)

Select Tooling Interfaces

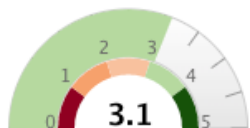




Process mining the developer journey.



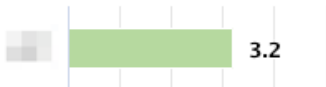
's Team's Experience ⓘ



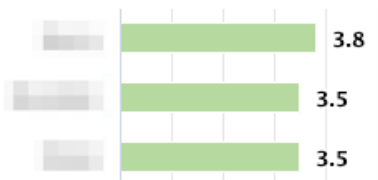
Overall Experience Index ⓘ

Change user

Manager



Peers



Top Insights for ⓘ

Productivity Initiatives



's Team's Developer Experience Metrics ⓘ

Filter by:

Metric: 3 ▾

Persona ▾

Region ▾

Repository ▾

LinkedIn Metrics ⓘ

Developer Build Time P90 ⓘ

Over last 6 weeks

↑23.7% ⓘ
vs. prior 6 weeks

1.7



Developer Build Time P50 ⓘ

Over last 6 weeks

↑22.3% ⓘ
vs. prior 6 weeks

2.5



Build CSAT ⓘ

Over last 6 weeks

N/A ⓘ
vs. prior 6 weeks

3.2



Types of Analytics

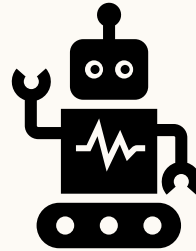
If analytics types are a progression, what comes next?



Descriptive



Diagnostic



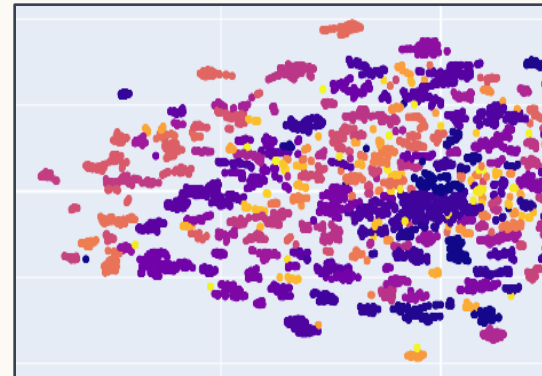
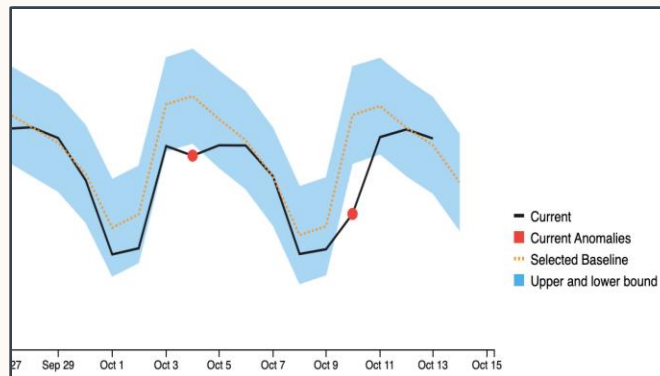
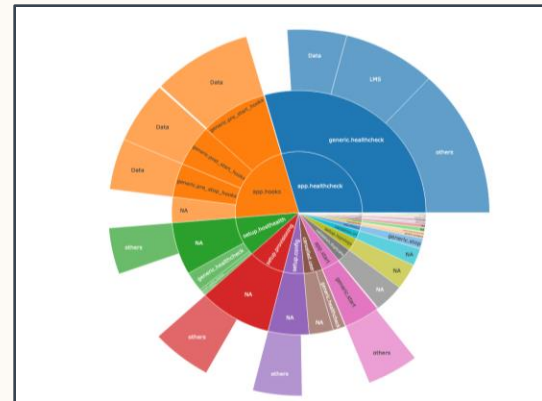
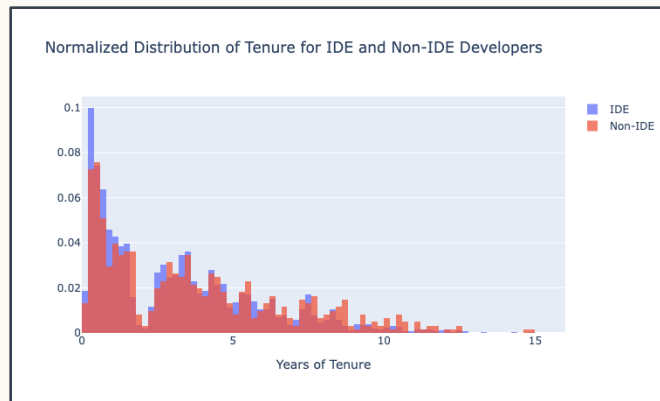
Predictive



Prescriptive

Augmented Analytics

The use of AI / ML to assist insights through custom models.





Python ▾

Examples ▾

how to send a bunch of messages to kafka



30 results (0.6920ms)

Top K: 30

Multiproduct:

File:



```
""" Send messages to kafka :param topic: a dict from self.topics :return: bool """
```

```
1 def kafka_batch_produce(self, topic: dict) -> bool:
2     """
3     Send messages to kafka
4     :param topic: a dict from self.topics
5     :return: bool
6     """
7     if not len(topic['messages']):
8         return False # skip kafka produce on 0 messages
9     messages_counter = 0
10    if self.kafka_client is None:
11        try:
12            self.kafka_init()
13        except IOError as e:
14            raise IOError(e)
```

```
$ coda -s "How to add memory to host?"
```

```
rain-admin quota adjust --product <STRING> -f <STRING> --add-cores <INT> --add-memory <INT>  
rain-admin quota adjust --product ██████████ -f ████████ --add-cores 120 --add-memory 410
```

```
rain-admin quota adjust --fabric <STRING> --product <STRING> --add-memory <INT>  
rain-admin quota adjust --fabric ████████ --product ██████████ --add-memory 160
```

Help:

quota: Manage resource quotas for a given allocation pool or...
adjust: Adjust resource quota by a percent of actual allocated (not
-f: The name of the Fabric [required]
--product: The name of the product associated with this resource quota.
--add-cores: 32 --add-memory 64
--add-memory: add in GBs of memory to the current quota limit
--fabric: The name of the Fabric [required]

Control+V to use the first command!

Questions and Answers

[View more results →](#)

accepted
answer

ImportError: numpy.core.multiarray failed to import - in prod

Python MP works fine in dev and after deploying in PROD getting ImportError:

1 vote



Asked on Jan 29 2019, 12:01:13 am PST by 

accepted
answer

Install Python numpy library

I want to use the Python numpy library for a task. How can I install it on my MBP?

1 vote



Asked on Mar 15 2020, 10:13:28 am PDT by 

Need immediate help resolving an issue?

If you are experiencing aberrant behavior with a LinkedIn specific tool or integration, oncall engineers are available to help!

[Request oncall assistance](#)

Support Requests

[View more results →](#)

TOOLS-191329 - import error and cannot be fixed by current solutions

Status **CLOSED**



Created on Jul 31 2018, 4:21:33 pm PDT by 

TOOLS-250229 - Can't ELR numpy Version 1.18.2

Status **CLOSED**



Created on Apr 03 2020, 11:15:24 pm PDT by 

Code Similarity Model

AI Model to detect similar code.

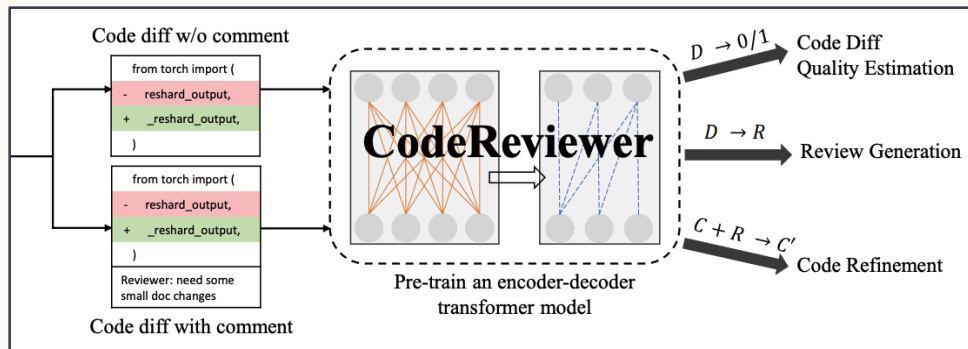
// Given:

```
def sum(a, b):  
    return a + b
```

// Find:

```
def add(a, b):  
    return a + b
```

```
def multiply(a, b):  
    return a * b
```



Contrastive learning on obfuscated code pairs to detect similar code snippets.

Automating Code Review Activities by Large-Scale Pre-training

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ABSTRACT

Code review is an essential part to software development lifecycle since it aims at guaranteeing the quality of codes. Modern code review activities necessitate developers viewing, understanding and even running the programs to assess logic, functionality, latency, style and other factors. It turns out that developers have to spend far too much time reviewing the code of their peers. Accordingly, it is in significant demand to automate the code review process. In this research, we focus on utilizing pre-training techniques for the tasks in the code review scenario. We collect a large-scale dataset of real-world code changes and code reviews from open-source projects in nine of the most popular programming languages. To better understand code diffs and reviews, we propose CodeReviewer, a pre-trained model that utilizes four pre-training tasks tailored specifically for the code review scenario. To evaluate our model, we focus on three key tasks related to code review activities, including code change quality estimation, review comment generation and code refinement. Furthermore, we establish a high-quality benchmark dataset based on our collected data for these three tasks and conduct comprehensive experiments on it. The experimental results

demonstrate that our model outperforms the previous state-of-the-art pre-training approaches in all tasks. Further analysis show that our proposed pre-training tasks and the multilingual pre-training dataset benefit the model on the understanding of code changes and reviews.

CCS CONCEPTS

• Software and its engineering → Automatic programming.

KEYWORDS

Code review, deep learning, datasets, pre-training

ACM Reference Format:

Zhiyu Li, Shuai Lu, Daya Guo, Nan Duan, Shailesh Jannu, Grant Jenks, Deep Majumder, Jared Green, Alexey Svyatkovskiy, Shengyu Fu, and Neel Sundaresan. 2022. Automating Code Review Activities by Large-Scale Pre-training. In *Proceedings of the 30th ACM Joint European Software Engineering Conference and Symposium on the Foundations of Software Engineering (ESEC/FSE '22)*, November 14–18, 2022, Singapore, Singapore. ACM, New York, NY, USA, 13 pages. <https://doi.org/10.1145/3540250.3549081>

1 INTRODUCTION

Code review, a process of manually inspecting source code by teammates other than the code author, is recognized as a critical part of the software development lifecycle [13]. Studies have shown the huge benefits of code reviews [1, 3, 32, 33]. Compared with the traditional code review process formalized by Fagan in 1976 [12], which avoids introducing errors and defects but is cumbersome, modern code review activities involve fewer formal requirements and aim at fully understanding code changes [4]. Given its benefits, code review has been widely adopted in both open-source and industrial projects. As shown by Yang et al. [45], in open-source projects, such as Qt, there are ten thousand reviews taking place every month (~22k reviews in case of Qt). However, it's not free

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^{*}Equal contribution.

[†]Work done during internship at Microsoft Research Asia.

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```
@Override
public void apply(@NonNull Project project) {
    project.getPlugins().apply(BasePlugin.class);
    project.getPlugins().apply(s: "li-base");
    project.getPlugins().apply(Container38MitigationPlugin.class);

    configureConfigurations(project);
    configureTasks(project);
}
```

 **Show Internal Usages**

[Go to Source Code](#)

```
@Override
public void apply(Project project) {
    super.apply(project);
}
```

[Reader Mode](#)

src/main/java
/com/linkedin/ligradle/mdc/MDCAndroidPlugin.java

[Go to Source Code](#)

[Go to Source Code](#)



.../publishing/series/newsletter/NewsletterSubscriberHubFeature.java

Outdated

Hide resolved

```
70 + public LiveData<Resource<PagedList<ViewData>>> fetchSubscriberHub(@Nullable String
53 71 subscriberHubLiveData.loadWithArgument(seriesUrn);
54 72 return subscriberHubLiveData;
55 73 }
```

Comment on lines 70 to 73

Hi 👋 I'm Casper 🧛, an AI that reviews code based on past comments.



Here's a comment that looks relevant to the current change:

This can be replaced with `return subscriberHubLiveData.loadWithArgument(seriesUrn);`

Casper does not reply to comments but you can use the 👍/👎 reactions for feedback. Reach out to #ask_developer_insights for questions.

Reply...

Describe
Diagnose
Predict
Prescribe
Augment!