Module 1: Bayesian Knowledge Tracing

BKT-BF walkthrough

Introduction

This guide seeks to help beginners with Java Environment Setup, JetBrain IntelliJ IDEA installation, and run Bayesian Knowledge Tracing Brute Force model fitting code(BFK-BF) by Baker, Corbett, Gowda, Wagner, MacLaren, Kauffman, Mitchell, & Giguere(2010).

This BKT-BF walkthrough guide is based on Macbook Air 2020, M1. We will specify when you need to pay attention to anything here.

Section 1: Java IDE and Environment Setup

Application for JetBrain Educational License

If you haven't applied for an educational license for JetBrain IntelliJ IDEA, please follow the instructions below to do so. If you have your own preferences about Java IDEs, please move on to the next step.

Having an educational licenses allows you to use all the Pro version of JetBrains IDEs(e.g. PyCharm(Python), WebStorm(HTML), PhPStorm(PHP), IntelliJ IDEA(Java) etc.).

Apply for an educational license for JetBrain via this website:

https://www.jetbrains.com/community/education/#students

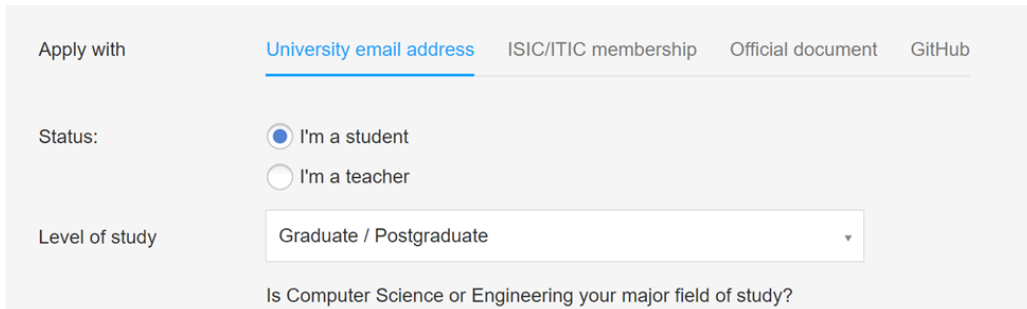You should have a .edu email address to apply.

Application

1. Scroll down, Click **"Apply now"**

   Get free access to all developer tools from
   JetBrains!

   Apply now

2. Usually, we apply with a **University email address, but feel free to apply with other methods if you have one.**

Apply with	University email address	ISIC/ITIC membership	Official document	GitHub
Status:	● I'm a student			
	○ I'm a teacher			
Level of study	Graduate / Postgraduate			▾
	Is Computer Science or Engineering your major field of study?			

3. Please follow the instructions in the verification email to activate your account.

Install JetBrain Intellij IDEA

1. Go to https://www.jetbrains.com/idea/download/?section=mac Click .dmg
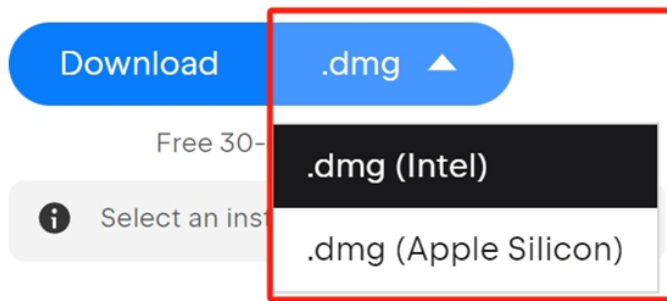
   If your Mac uses Apple M series processors, click ".dmg(Apple Silicon)"

   If your Mac uses Intel processor, click ".dmgApple(Intel)"

   If educational license is not available for you, please scroll down to download the community edition)
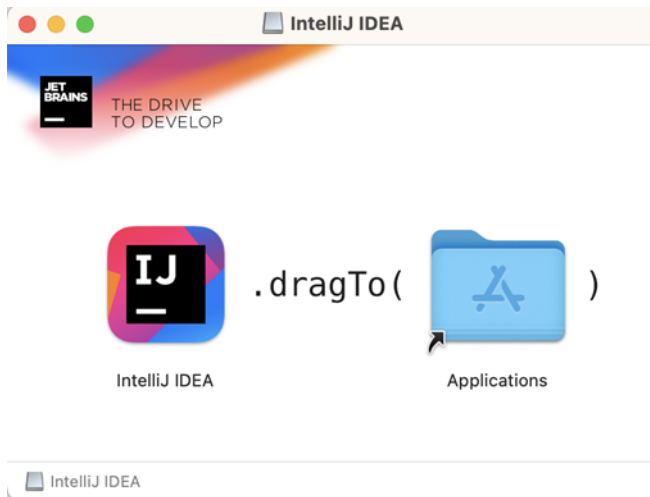
IntelliJ IDEA Ultimate

The Leading Java and Kotlin IDE

Step 2

Simply dragging it could install the IDEA

Install Java Environment and Activating Intellij

1. Go to:https://www.oracle.com/java/technologies/downloads/#java21

If your Mac uses Apple M series processors, download "ARM64 DMG Installer"

If your Mac uses Intel processors, download "x64 DMG Installer"

Step 2

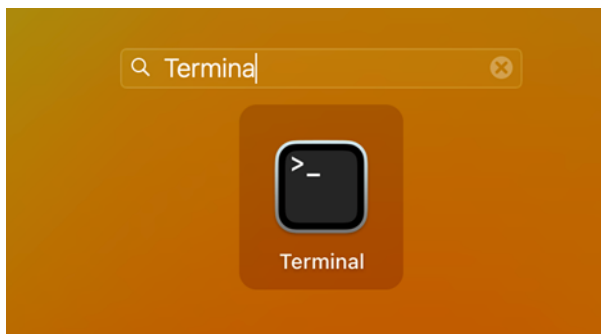2. Open it, Click continue, then install. You might need to wait for a minute before continuing the following steps.

Step 3

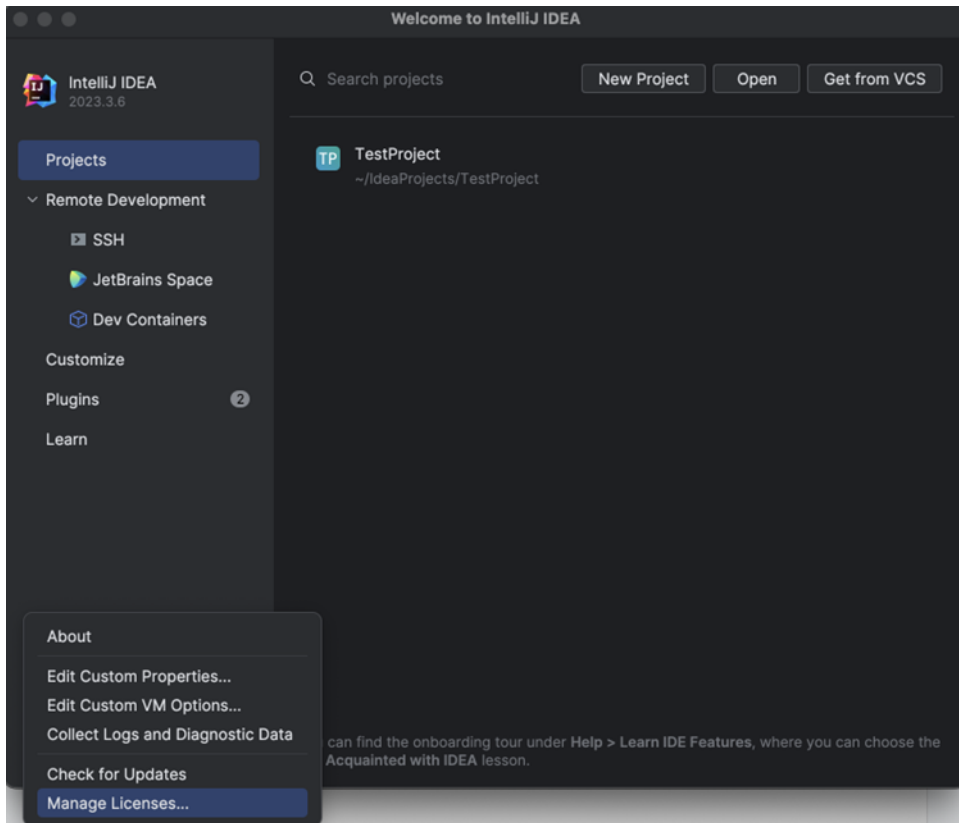Click the Launchpad icon in the Dock, type Terminal in the search field, then click Terminal.

Type Java -version, you should see below. My laptop installed JDK22, you should see JDK21.

Step 4

Now Let's open Intellij IDEA, Click settings on the button left, then Manage Licenses.

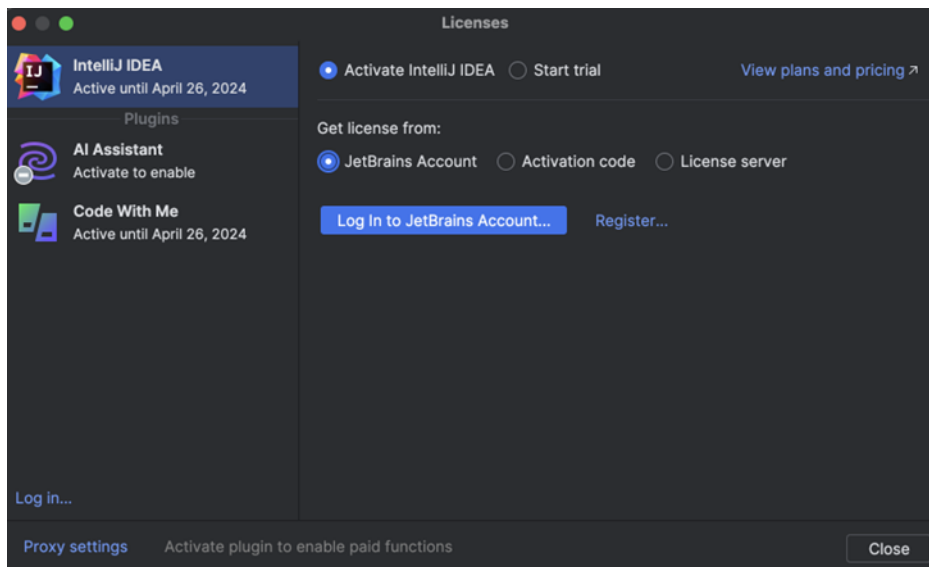For the first time you open it, you may need to agree to **the terms of service** and then decide **whether or not you would like to share your data**

This option is based on your willingness and will not affect your later use of this tool.

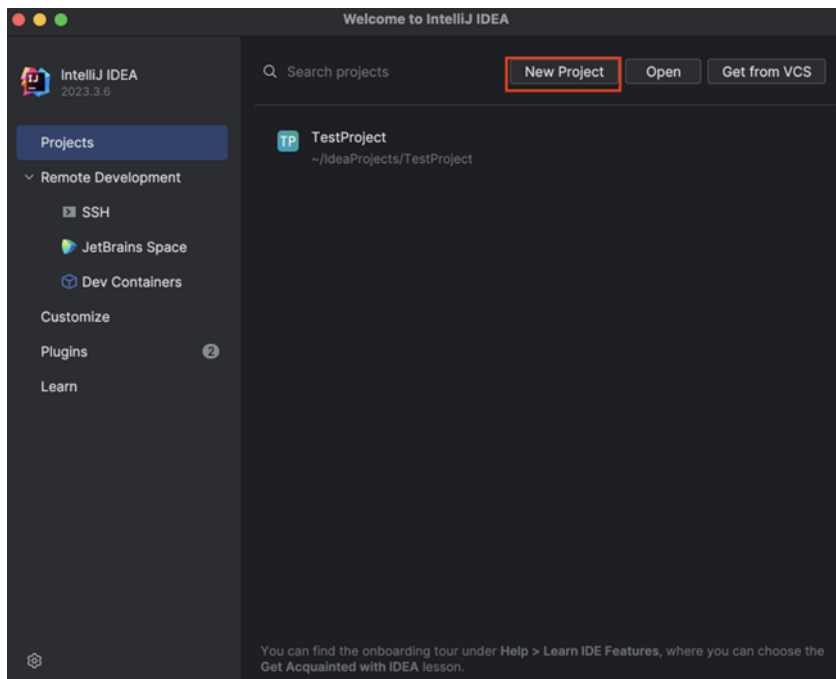**Step 4-2**

Activate your Ultimate edition by "Log in to Jetbrains account"
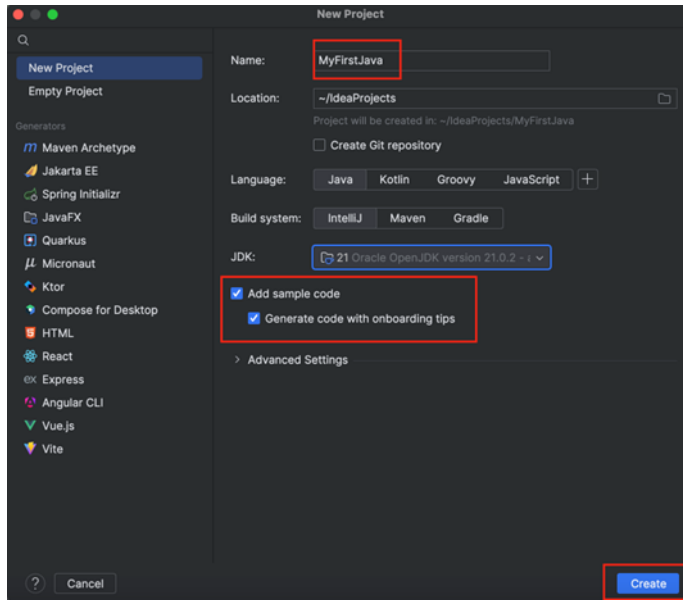
Java Test Run

Now Let's try create your first Java project, click **New Project**
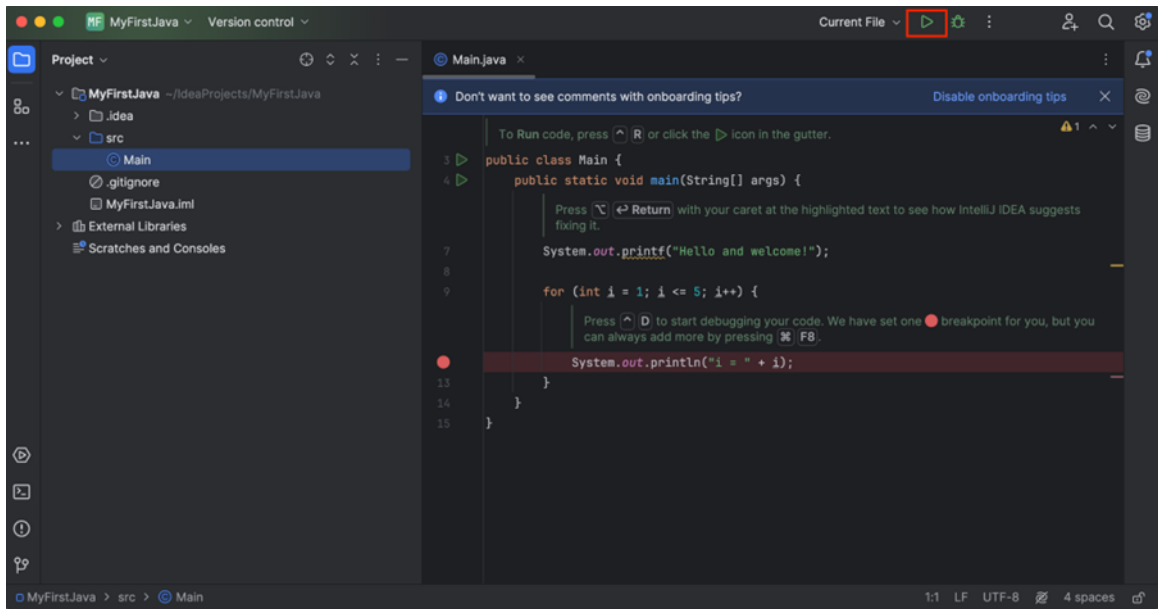
Step 2

1. Then, change the name of your project, Check Add sample code(No need for future projects, just for testing).

Step 3

3. You might need to wait for few seconds for the first-time loading, then click "Run"

Step 4

    4. Congratulations on your first Java Run!


```
/Library/Java/JavaVirtualMachines/jdk-21.jdk/Contents/Home/bin/java -ja
Hello and welcome!i = 1
i = 2
i = 3
i = 4
i = 5


Process finished with exit code 0
```

BKT-BF

We successfully installed the Java environment and IDEA. Now we come to the actual BKT-BF code.

Please download the BKT-BF with this link: https://learninganalytics.upenn.edu/ryanbaker/BKT-BruteForce.zip

Baker, R. S. D., Corbett, A. T., Gowda, S. M., Wagner, A. Z., MacLaren, B. A., Kauffman, L. R., … & Giguere, S. (2010). Contextual slip and prediction of student performance after use of an intelligent tutor. In *User Modeling, Adaptation, and Personalization: 18th International Conference, UMAP 2010, Big Island, HI, USA, June 20-24, 2010. Proceedings 18* (pp. 52-63). Springer Berlin Heidelberg.

For copyright statement, please refer to https://learninganalytics.upenn.edu/ryanbaker/edmtools.html

1. Extract BKT-BruteForce.zip

2. Copy computeKTparamsAll.java, right click on the src folder, then click Paste, then click OK

3. Similarly, copy TestData.txt, and paste to the root folder. Mine's name is MyFirstJava

4. Now you may run the BKT-BF file, click Run, you should see:

This output means: The best parameters for Skill META-DETERMINE-DXO are: L0 = 0.001, G=0.001, S=0.1 T=0.724 The best parameters for Skill META-DETERMINE-MIDDLE-GENE are: L0 = 0.001 G=0.235 S=0.1 T=0.09

5. Now you successfully ran the BKF-BF fitting method, If you have any data of your own, you can fit your BKT model to your own data! Just match the format in File. (TestData.txt)