Jupyter in Education Poster

How to become financially independent with interactive widgets

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Introduction

Is it possible to use jupyter notebooks and interactive widgets to keep students engaged?

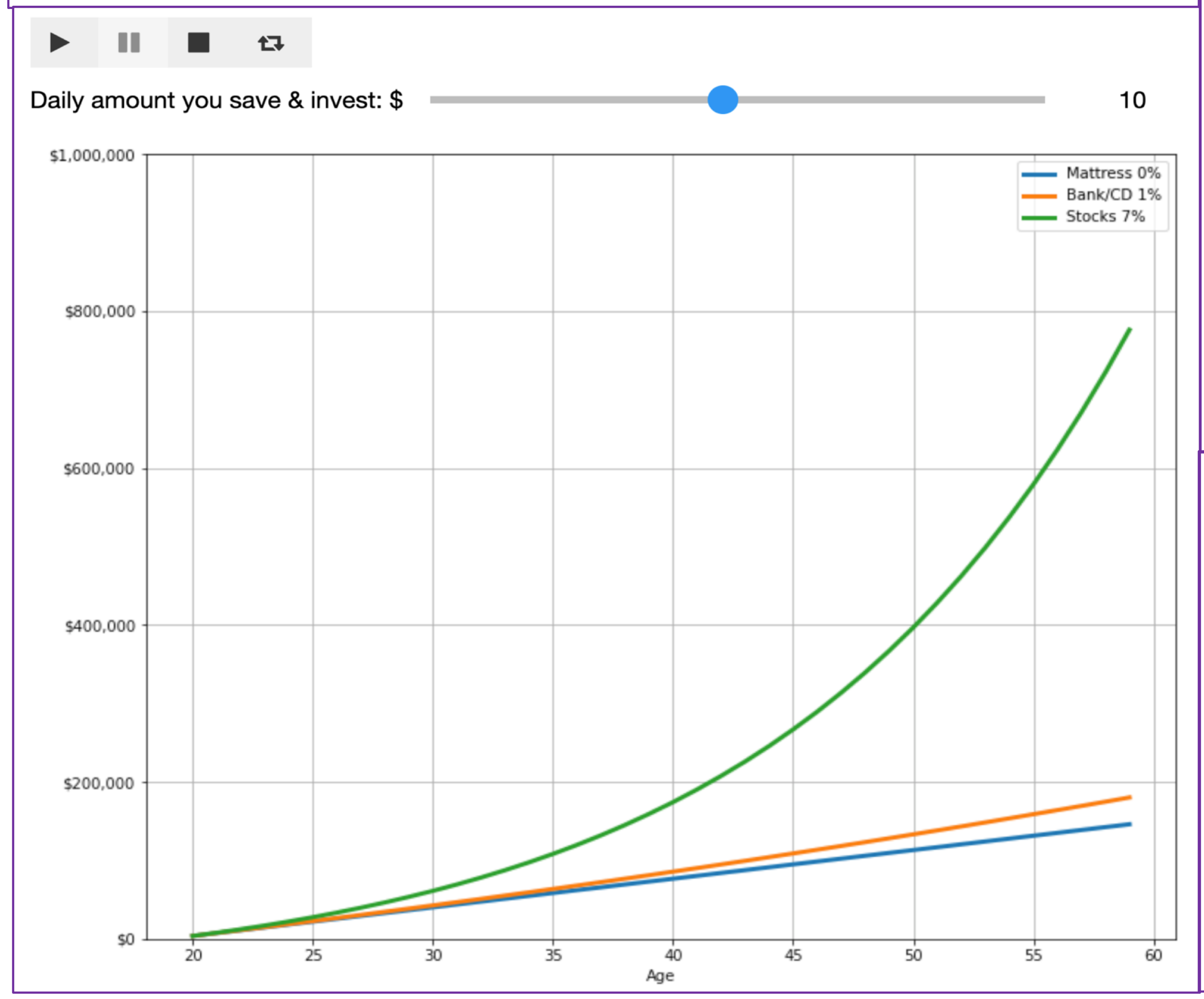
The short answer is ***yes***, especially if the subject matter can be enhanced by customizable visualizations.

This summer I setup an online session using jupyter with interactive widgets to teach a set of interns about **FIRE (Financial Independence Retire Early).** I used pandas to manage the data and matplotlib for the visualizations.

Overall, I think my notebook and lesson were greatly improved by adding the interactive widgets. I was impressed by how easy the widgets were to use and I recommend trying them if your subject matter can be interactive.

Example 1

The first example highlights the play widget. The visualization is a graph demonstrating how compound interest can grow your money over time. When a student hits the play button they will see what happens to their money over 30 years if they invest $1 a day then $2 a day all the way up to $20 a day.



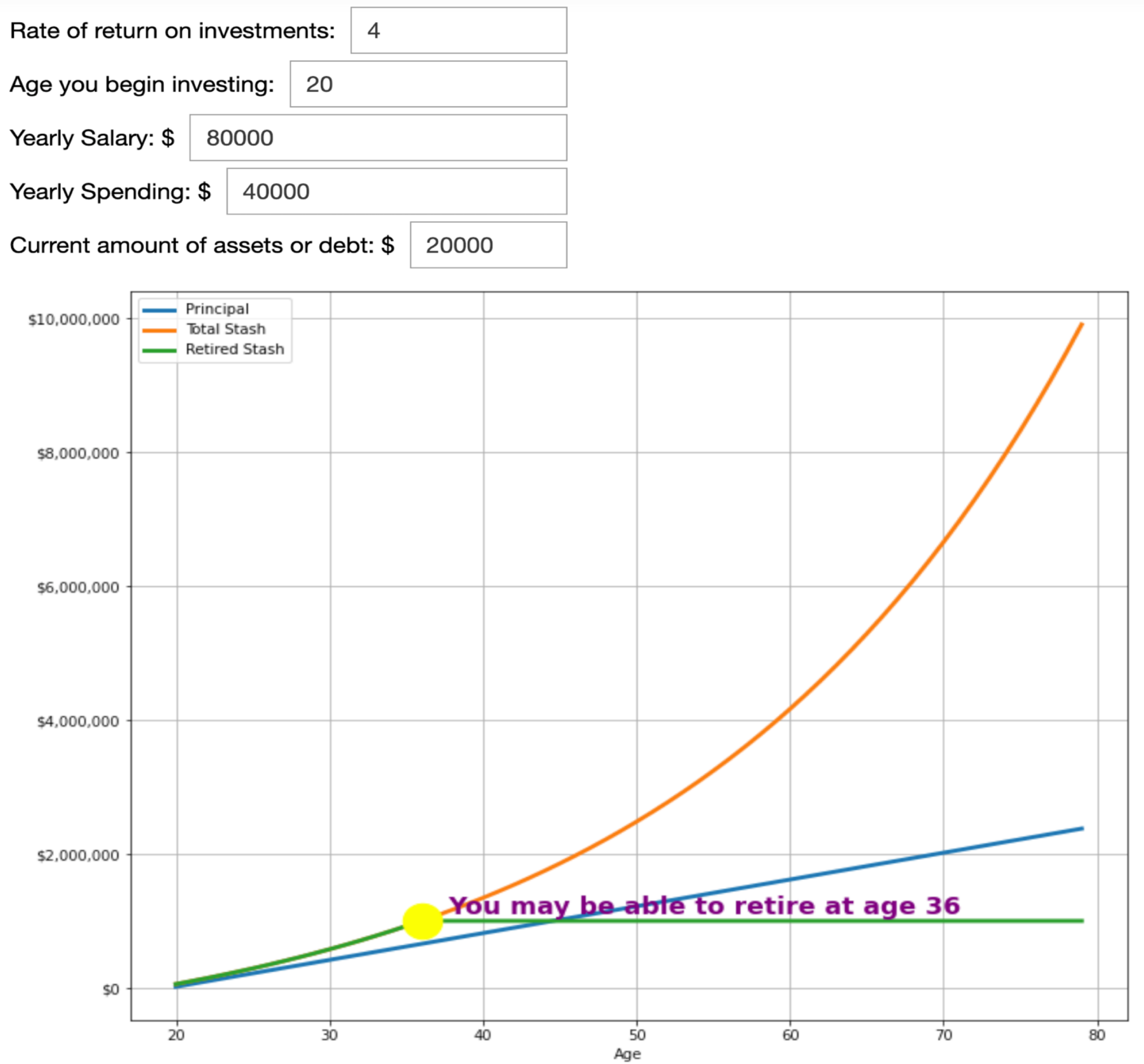
Daily amount you save & invest: $ 10

Example 2

The second example is a simple FIRE calculator that allows you to enter several variables to determine when you can retire. The math is based on a core FIRE concept called the 25% rule.

If you accumulate 25 times your annual spending then you achieve financial independence.

The basic theory is that you should be able to live off the interest of that stash of money forever.



Rate of return on investments: 4

Age you begin investing: 20

Yearly Salary: $ 80000

Yearly Spending: $ 40000

Current amount of assets or debt: $ 20000

Challenges

Though I am an experienced data engineer I did encounter several challenges developing these Jupyter notebooks. Getting the interactive widgets working was straight forward, however I did not modify the layout of the widgets which might be complicated.

The main challenges involved trying to get the matplotlib visualizations to look decent and function properly.

- Unable to use df.plot(). I needed more control.
- Primary matplotlib challenges:
  - Learning curve wit figures, axis, and subplots.
  - Scientific notation display troubles.
  - Adding currency to labels was surprisingly hard.
  - Ax.annotations frustrations. ax.scatter & ax.text instead.
  - Hardening code to handle a broader range of user inputs.

I am new to matplotlib, but it seems like it has the power to do some very impressive visualizations if you have the patience.

Conclusion

If you are up for the coding challenge and if you like to teach using Jupyter notebooks, then try making your lessons more compelling by adding some interactive widgets.

Feel free to borrow any of my code and see my widgets in action at https://github.com/kcdoo/jupytercon2020 and then play with the FIRE calculator and see when you might be able to retire.

Resources

- FIRE Intro on Youtube - https://www.youtube.com/watch?v=8si7cqw9wm0
- FIRE retirement calculator - https://playingwithfire.co/retirementcalculator/
- Mr. Money Mustache & the 4% Rule - https://www.mrmoneymustache.com/2012/05/29/how-much-do-i-need-for-retirement/
- compound interest - https://www.fool.com/how-to-invest/thirteen-steps/step-1-change-your-life-with-one-calculation.aspx
- Jupytercon2020 notebooks supporting this poster and talk - https://github.com/kcdoo/jupytercon2020