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# **Earnings Exploration: A Focus on Gross Estimation**

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Aniket Bansal

Atharva Abhijit Joshi

Eitika Sharma

Ishan Ganguly

Salman Tahir

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# **1. Introduction**

The pursuit of estimating gross income from available key data components such as net income, national insurance, and income tax represents a commendable initiation. This report takes a closer look at how the method for figuring out gross income works. It talks about the things that the method is good at, the challenges it faces, what it does well, and ideas for making it even better. The report emphasizes that figuring out gross income is not a straightforward process and suggests ways to improve it.

# **2. Methodology**

## 2.1 Data Input:

The input phase involves extracting data from a CSV file, comprising monthly net income, and location.

## 2.2 Calculation Functions:

The way we figure out gross income involves using two important Python functions - 'gross\_to\_net', and 'net\_to\_gross'.

The function 'gross\_to\_net' helps us find out net income from gross income by looking at special tax brackets. The second function 'net\_to\_gross' does the opposite, figuring out gross income from net income. Both functions carefully use tables that have specific information for the UK and Scotland. These tables include details about income tax and national insurance brackets, along with the rates that applies to them.

## 2.3 Iterative Calculation:

During this part of the process, we carefully work through each income entry to figure out their estimated gross income. We took their monthly net income, calculate what it would be for the whole year, and use a special function that works backward to find their total yearly income. This step ensures a precise estimate for each person's annual earnings.

# **3. Limitations**

## 3.1 Complex Deductions:

Figuring out deductions like pensions, provident fund contributions, and long-term repayments, such as student loans, is tricky. The method can struggle with deductions tied to big commitments like car or house loans spread over several years, making it hard to get the gross income right.

## 3.2 Bonus Payments and Overtime Oversights:

The method might miss accounting for bonus payments, overtime, or extra reimbursements that employees get separately from their regular salary. This misses out on important parts of income, affecting the accuracy of gross income calculations.

## 3.3 Insurance Refund Loopholes:

While the National Health Service (NHS) covers health-related stuff, the method doesn't fully consider that employers pay for dental and optical insurance, and these payments go directly to employees' bank accounts. This aspect needs more attention to improve accuracy.

**4. Strengths**

## 4.1 Efficiency in Calculation:

A notable strength lies in the utilization of a binary search algorithm within the `net\_to\_gross` function, which makes our calculations quick. It helps us estimate gross income from net income in a snap. This efficiency in calculations is a big plus for our method, making everything smoother and faster.

**5. Potential Improvements**

## 5.1 Enhanced Documentation Integration:

Strengthening the implementation through the integration of detailed documents, including loan agreements, bonus payment records, and transaction statements, promises to enhance the granularity of gross income estimation. This step ensures a more comprehensive consideration of financial intricacies, addressing current limitations in deductions.

## 5.2 Advanced Machine Learning Refinement:

Exploring the potential of machine learning algorithms, particularly in the intricate realm of payment classification, holds promise for refining the implementation. This enhancement is crucial, especially for transactions like bonus payments and reimbursements, where a more nuanced understanding is essential for accurate gross income estimation. By fine-tuning our algorithm. We aim to improve the classification accuracy and overall robustness of the methodology.

## 5.3 Incorporating Additional Income Documents:

To provide a more holistic understanding of an individual's income, we propose incorporating specific documents related to bonus payments, overtime, and reimbursements. This addition ensures a more comprehensive evaluation of income components, addressing current limitations and contributing to a more accurate overall estimation.

# **6. Conclusion**

As we conclude our evaluation of gross income estimation, it's evident that our methodology serves as a sturdy foundation. However, recognizing its existing strengths and limitations opens the door for refinement.

Navigating the intricacies of net income, national insurance, and income tax is no easy feat. The dynamic duo of 'gross\_to\_net' and 'net\_to\_gross' plays a crucial role in maneuvering through distinct tax brackets tailored to the UK and Scotland. Despite the robust nature of our process, challenges emerge, ranging from navigating tricky deductions to overlooking bonus payments and insurance refunds.

Our methodology's expertise lies in its efficiency, thanks to binary search algorithm. This algorithm ensured a swift and precise calculations, contributing to the overall effectiveness of our approach.

Looking ahead, there's a promising horizon of improvements. A more thorough integration of paperwork, smarter utilization of machine learning, and a detailed examination of income-related documents stand out as key areas for enhancement. These proposed adjustments aim to address current limitations, providing a clearer and more comprehensive understanding of individuals' income dynamics.

In essence, while our methodology is a commendable starting point, the journey doesn't end here. By acknowledging and proactively addressing limitations, we pave the way for a more accurate, adaptable, and sophisticated approach to gross income estimation. This evolution aligns our methodology with the ever-changing landscape of personal finances.