Moutaoikil-Ripà's conjecture on Prime Numbers: $\forall\ p_0 \geq 7,\ p_0 = 2 \cdot p_1 + p_2$

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Abstract

An original result about prime numbers and unproved conjectures. In this paper I will show that, if the Goldbach conjecture is true, any prime number greater than 5 can be expressed as the sum of a prime and the double of another (different) prime. A computational analysis shows that the conjecture is true (at least) for every prime below 7465626013.

1. Introduction

A few days ago, I discovered a quite strange, new, conjecture involving prime numbers [http://vixra.org/pdf/1307.0081v1.pdf]. It remembered me the very famous Goldbach's conjecture (by Christian Goldbach and Leonard Euler).

The statement is as follows:

Moutaoikil-Ripà's Conjecture. *For every prime number $p_0 \geq 7$, we have that $p_0 = 2 \cdot p_1 + p_2$ (where p_1 and p_2 are both primes and $p_1 \neq p_2$).*

2. "Proof" (assuming Goldbach's conjecture as true)

Let us consider a base 10 scenario and <u>let us assume Goldbach's conjecture as true</u>, we can see that we have just two cases to analyze ($p_1=2$ or $p_1>2$).

In fact, $p_0=2\cdot n+1 \rightarrow 2\cdot p_1+p_2$ is odd only if p_2 is odd (p_1 is the only prime which can be 2).

Let us assume $p_1\neq 2$, we will show that, assuming Goldbach's conjecture as true, the new conjecture is true as well (for any $p_0\geq 11$). It is trivial that, if $p_0=7$, there is only one possible solution (but there is one!) and it is $7:=2\cdot 2+3$.

We have the following constraints:

$$\begin{cases} p_1 \neq p_2 \\ p_1 \neq 2 \\ p_2 \neq 2 \\ p_1, p_2 \; are \; prime \end{cases} \rightarrow \min[p_1+p_2]=3+5=8 \rightarrow \min[2\cdot n]=8 \rightarrow \min[n]=4.$$

Thus $p_0-p_1\geq 8 \rightarrow \min[p_0]$ such that $p_1=2 \rightarrow \min[p_0]=11$ (because $11=8+3$).

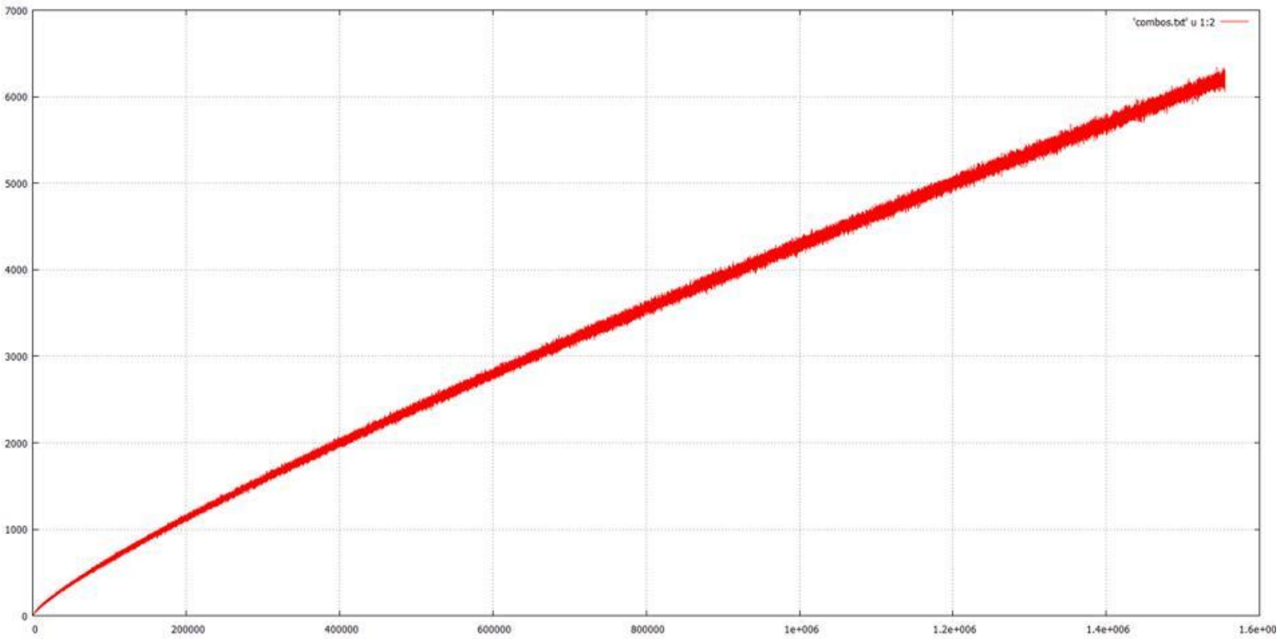
$p_0=2\cdot p_1+p_2 \rightarrow p_0-p_1=p_1+p_2$. But Goldbach said that $2\cdot n=p_1+p_2$, where (in our case) n is an element of $\mathbb{N}\backslash\{0,1,2,3\}$ and $p_1+p_2\geq 8$.

The new relation we have to "prove" is easy now: p_0-p_1 is the difference between two odd primes $\rightarrow$ it is <u>even</u> ($p_0-p_1\geq 8$), as we have already shown… and, on the other side of the "=", there is the sum of two distinct primes? Goldbach? Yes, but we need to point out that we are searching for $p_1\neq p_2$ solutions only.

But we can see that, for every value of n we are considering ($n\geq 4$), the <u>partition number</u> of $2\cdot n$ is ≥ 2 (so we have at least one solution of the form $p_1\neq p_2$). (**Q.E.D.**)

3. Computational analysis

Emanuele Dalmasso wrote a specific program to test the new conjecture for "small" values of p_0: the test has shown that the conjecture is right for any $7\leq p_0\leq 746562601$ ($746562601=2\cdot 7+746562587$).
p_0 can be written in many different ways (for $11\leq p_0$): you can see this just looking at the figure below (the number of ways such that $p_0:=2\cdot p_1+p_2$ is shown on the vertical axis).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