SDSS3: Type Ia Supernovae redshift ≤ 0.5 analysis on the basis of there respective distances

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***Abstract*— I present the prediction for Type Ia supernovae on the basis of their distances.This research is based on data from the Sloan Digital Sky Survey II (SDSS-II) Supernova Survey. The adopted sample of supernovae (SN) have redshift ≤ 0.5. More than 95 sample of supernovae has been collected to predict the statement. I compared recessional velocity (is the rate at which an extragalactic astronomical object recedes from an observer as a result of the expansion of the universe. The product of redshift and speed of light gives us the same) to the distance from the supernova.**

***Index Terms*— Supernovae, redshift, speed of light (c), Recessional velocity**

I. INTRODUCTION

Type Ia supernovae (SN Ia) occupy a prominent position in contemporary astrophysics. The SN Ia is a type of supernova that occurs in binary systems (two stars orbiting one another) in which one of the stars is a white dwarf. The other star can be anything from a giant star to an even smaller white dwarf. This report has generate errorbar plot between rescssional velocity (RN) and distance from the supernovae to make prediction.Type Ia supernovae have a characteristic light curve, their graph of luminosity as a function of time after the explosion. Near the time of maximal luminosity, the spectrum contains lines of intermediate-mass elements from oxygen to calcium; these are the main constituents of the outer layers of the star. Months after the explosion, when the outer layers have expanded to the point of transparency, the spectrum is dominated by light emitted by material near the core of the star, heavy elements synthesized during the explosion; most prominently isotopes close to the mass of iron (iron-peak elements). The radioactive decay of nickel-56 through cobalt-56 to iron-56 produces high-energy photons, which dominate the energy output of the ejecta at intermediate to late times.

II. Data Collection

This data has been poised from Sloan Digital Sky Servey II (SDSS3).

Here is the header of the data collected from the SDSS3 archive.

#SuperNovaName	distanceToSupernova	redshift	redshiftUncertainty
2005fb	887.741476	0.158880	0.061476
2005fd	1329.235687	0.248201	0.042153
2005fh	555.676112	0.123402	0.008953
2005fi	1346.571401	0.351156	0.136484
2005fo	1326.929293	0.243986	0.032451

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III. Analysis

A. Creating a equation for the data

The best fitting parameters of a linear fit to the data through the method of ordinary least squares estimation. (i.e. find m and b for y = m*x + b). Here is the equation I obtained

$$y = mx + b$$

$$Denominator = D = \sum \frac{1}{dy^2} \sum \left(\frac{x}{dy}\right)^2 - \left(\sum \left(\frac{x}{dy^2}\right)\right)^2$$

$$m = \frac{\sum \frac{1}{dy^2} \sum \frac{xy}{dy^2} - \sum \frac{x}{dy^2} \sum \frac{y}{dy^2}}{D}$$

$$b = \frac{\sum \frac{x^2}{dy^2} \sum \frac{y}{dy^2} - \sum \frac{x}{dy^2} \sum \frac{xy}{dy^2}}{D^2}$$

$$d_m = \sqrt{\frac{\sum \frac{1}{dy^2}}{D}}$$

$$d_b = \sqrt{\frac{\sum \frac{x}{dy^2}}{D}}$$

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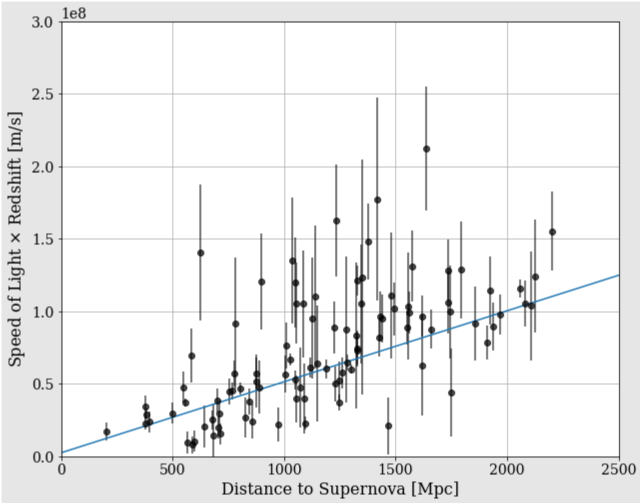
Equation represents
x: Numpy array of independent variable data
y: Numpy array of dependent variable data. Must have same size as x.
dy: Numpy array of dependent variable standard deviations. Must be same size as y.

B. Creating the Errorbar for the data

The data contained redshift, I need to convert into Recessional velocity.



IV. CONCLUSIONS

Above errorbar plot for reccesional velocity to supernova distance concluded that the supernova which is 1000 to 1500 MPc away have redshift concentrated between 0.5-1 whereas more is the distance from the supernova more is the redshift.

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