

Role of Artificial Intelligence in Biological Problems With emphasis on Rural Development

Dr. Mahesh Chandra¹ and Miss Rohini Yadav²

¹Assistant Professor, Department of Mathematics, FS University, Shikohabad, Uttar Pradesh, INDIA.

²Assistant Professor, Department of Zoology, FS University, Shikohabad, Uttar Pradesh, INDIA.

¹Corresponding Author: maheshchandra2047@gmail.com



www.jrasb.com || Vol. 4 No. 4 (2025): August Issue

Received: 09-08-2025

Revised: 13-08-2025

Accepted: 18-08-2025

ABSTRACT

The Present Paper explores how Artificial Intelligence can be used to develop some Biological models and how they are helpful in the Rural development, Rural developments means problems of Agriculture and emphasis will be on how the variety of crops not at in usual manner which is yet following. Artificial Intelligence provide a Platform in the field of Rain water harvesting. Generic medicine, drug discovery. Diagnosis and treatment of various diseases for Rural development we can reduce waste, increased out, the present Paper summarizes the capability of AI by developing some models in the field of Biology, Agriculture and Bio based Plant which are quiet necessary for Rural development.

Keywords- Diagnosis, harvesting, generic medicine.

I. INTRODUCTION

Most of Researchers have already worked on Some similar topics we will like to mention their work which has motivated us to work on this Topic. The Excellent work of Charles Perkins (2025) who used the the word Biological Intelligence and developed a Model to refine molecules with enhanced intensity ne function inside the mammalian cells. Scope of Artificial Intelligence seems in the field of Education, agriculture Transportation, Health, Astronomy, Game, Finance, data Security, social media and Automakers etc, but we have restricted ourselves the factors which are directly or Indirectly related to rural development and all issues which a rural Indian is facing basically Health, education and food and care of various illness. Agriculture is an area which requires various resources, labour, money and time for better output. In resnet time Agriculture has become digital and AI emerging in field, Neha Saini (2025) has done an excellent work on Artificial Intelligence and Its application in various fields. Sava petimi (2025) edited about risk aware Autonomo as septem, Dibizi (2025) Correlated of swimming Performance forgoing behaviour

of Jelly fish. Spastman, S (2025) used AI invasions for Numerical Solution and swimming Performance forgoing behaviour of Jelly fish. Spastman S (2025) used AI invasions for Numerical Solution. Ten and Envard (2025) studied loosed AI on turbulent flows near the wall and presented a very excellent show case of Blood flows pattern. Waton and Ku developed a AI model for Fluid mechanic for cardio-vascular diseases. Dibizi (2025) Correlated of swimming Performance for the behavior of fish. Zhou (2025) shoused that coronary arterial is envere of Associated cirth the severity of coronary lesson. tho was the mile stone is the tender standing the flour Plates of Blood. Nimar M. (2025) used Artificial intelligence for computational assesment for targeted drug Therapy and stenosed arterial problem and he also show the effects of magnetic field on Blood Profiles the used the practice was fluid suspension model to find out various parameters of blood flow such as velocity, strain, etc. Since we have restricted our study for Rural development. Therefore, arise two types of problems which a rural person face

- (1) How he Increases his income for better standard of living

(2) In case of various diseases how he can diagnosis diseases that at minimum cost:

Fishries Industry: Fisheries Industry is basically for in Rural belt of India, So that it is one of those by which a rural person can Increase his income.

Mathematical modelling and Governing Equations:- In a pond if we drop some seed of fishes after some time some of them will and some will grows up, let us consider B represented birth and D represents the death, it will be represented by

$\frac{dB}{dt} - \frac{dD}{dt} = \alpha$ if in this case there are three possible values of α

$\alpha = 0$, $\alpha = \text{Positive}$ $\alpha = \text{Negative}$

(1) $\alpha = 0$ No Profit No Lose

(2) $\alpha = \text{Positive Profit case}$.

(3) $\alpha = \text{Negative Loss Case}$

So with the help of AI Second case must be achieved of Birth Death Process to ergodic then there exists steady state probabilities $\pi_k = \lim_{f \rightarrow \infty} P_k(\alpha)$ where $P_k(\alpha)$ is the probability that the birth and death process in the state k at a time. Then limit exists independent of initial values $P_k(0)$ and is calculated by the relation.

$$\pi_k = \frac{k}{\pi} \frac{\lambda_{i-1}}{\mu_i}, K = 1, 2 \dots \dots \dots (1)$$

$$\pi_0 = \frac{1}{1 + \sum_{k=1}^{\infty} \prod_{i=1}^k \frac{\lambda_{i-1}}{\mu_i}}$$

These limiting probabilities are obtained from infinite sum of differential equation

$$P^1_0(t) = \mu_1 P_1(t) - \lambda_0 P_0(t)$$

$$\pi_0 = \frac{1}{1 + \sum_{k=1}^{\infty} \prod_{i=1}^k \frac{\lambda_{i-1}}{\mu_i}}$$

These limiting probabilities are obtained from infinite sum of differential equation

$$P^1_0(t) = \mu_1 P_1(t) - \lambda_0 P_0(t)$$

$$P^1_0(+) = \lambda k - 1 P_k - 1(t) + \mu k + 1 P_{k+1}(t)$$

$$\text{having initial condition } \sum_{\mu=0}^{\infty} P_k = 1$$

Rain Water Harvesting:- Rain water harvesting is very important issue for Rural development. Because in the season of rain most of the water goes to waste. It is collected safely and in summer season. It will be very useful to grow different crops and play an important role in rural development.

Mathematical model and governing equations:-

Let us consider rainwater in flow (P_i) the volume of water collected is given by the formula

$$P_i = R_i \times A \times C$$

Where R_i – Rain fall depth

P_i – Rain water in flow

C_i is the run off coefficient

$V_i - 1 + P_i > V_{\max}$ then V_i will be maximum and excess water is considered as overflow

Demand (y_i):- This variable shows how much water demand is supplied by stage of harvested rain water.

The model describes the demand based on available water in the tank.

Case I- $V_{i-1} - V_{i-1} + q_i > D_i$, Where D_i is demand then $y_i = D_i$

Case II:- if $V_{i-1} + Q_i < D_i$ then y_i is equal to $V_i + Q_i$ and deficit arises.

Here evaporation is neglected

Crop Growth model :-

Linear mixed model

$$Y = X\beta + Z_n U_n Z_d U_d + \dots \dots \dots (3)$$

U_d – dominance capture predicated generic potential for by G_{pot} , $I = \hat{U}a, i + \hat{u}d, i$

For a specific crop maize, wheat, rice

Milk dairy management system:-

Digital management tools automated record keeping schedule milking monitor the milk quality and track herd of real time.

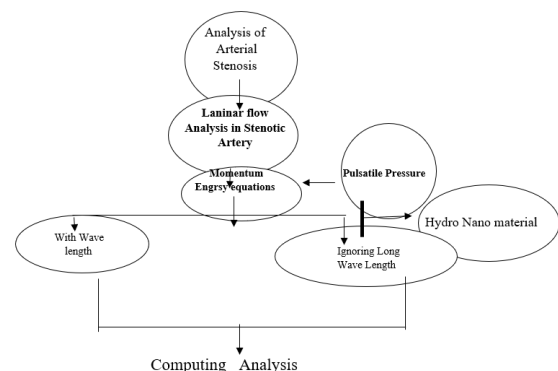
Document Impact:- Milk yield increases by 15-20% and feed cost decreases by 25%. With precision Technique Precision Techniques in Agriculture and dairy farming utilizes advanced technologies like sensors, Automatic or data Analytic and robotics to enable tailored elate Darion management, which is based on the following factors

- Automated milking System.
 - Animal monitoring system
 - Remote and Proximate surprising
 - Data Analysis and Decision support System
- Which at results the following benefits
- Labor saving.
 - Improvement of Animal health
 - Higher milk quality
 - cost and resource efficiency
 - enhanced sustainability.

Precision technique are Transforming modern dairy farming by marketing it more intelligent, responsive and sustainability through Technology drives operational Improvement.

Health Issues:- Health Issues is a very vital problem for Indian Rural. An Attempt has been made to understand one problem only.

II. MATHEMATICAL MODELLING AND GOVERNING EQUATIONS



Blood is considered as a Composition of

- Plasma - 50-60%
- Red cell - 40- 50%
- White Cell - 0.7 %
- Platelets - 0.3%
- Other - 2%

Blood Vessels Plays Significant important in Specially heart diseases

(1) **Stenotic time:-** The Governing equation will be

$$\bar{R} \bar{Z} \left\{ \frac{R_0}{R_0} - S \sin \left[\pi \left(\frac{\bar{Z}-d}{t_0} \right) \right] \right\} \bar{z} - cd + l_0$$

.....(4)

(2) Shear Strees Will be in the form

$$\tau_i = \left\{ 2 \left(\bar{\mu} \bar{b} + \frac{Py}{\sqrt{2\pi}} \right) \right\} e^i \bar{\pi} > \bar{\pi} e_i$$

$$\tau_i = \left\{ 2 \left(\bar{\mu} \bar{b} + \frac{Py}{\sqrt{2\pi}} \right) \right\} \bar{e}_i \bar{\pi} \leq \bar{\pi}_c \text{(5)}$$

Where $\bar{\pi} = \bar{e}_{ij}$ in the Product of Development rate to itself

$\bar{\mu} \bar{b}$ is the viscosity

P_r is the stress

Pressure gradient :- $\frac{dP}{dz} = P_0 + P_1 \cos \bar{\omega} t + > 0$
.....(6)

Continuity and momentum equations will be

$$\frac{\bar{\mu}}{r} + \frac{\bar{\mu}}{dr} + \frac{d\bar{\omega}}{dz} \text{ (7)}$$

$$e \left(\frac{d\bar{\mu}}{dt} + \bar{\mu} \frac{d\bar{\mu}}{dr} + \bar{\omega} \frac{d\bar{\mu}}{dz} \right)$$

$$= \frac{d\bar{P}}{dr} + \mu \left(1 + \frac{1}{\beta} \right) \left[\frac{d^2\mu}{dr^2} \frac{1}{r} \frac{d\bar{\mu}}{dr} \right]$$

$$+ \left[\frac{d^2\mu}{dz^2} - \frac{\bar{\mu}}{r^2} \right]$$

$$e \left(\frac{d\bar{\omega}}{dt} + \bar{\mu} \frac{d\bar{\omega}}{dr} + \bar{\omega} \frac{d\bar{\omega}}{dz} \right)$$

$$= \frac{d\bar{P}}{dz}$$

$$+ \mu \left(1 + \frac{1}{\beta} \right) \left[\frac{d^2\omega}{dr^2} + \frac{1}{r} \frac{d\bar{\omega}}{dr} \right]$$

$$+ \frac{d^2\omega}{dz^2} \text{ (8)}$$

Energy Equation :-

$$(e \text{ cp}) \left(\frac{dT}{dt} + \mu + \frac{dT}{dr} + \bar{\omega} \frac{dT}{dz} \right) = K \left[\frac{d^2T}{dr^2} + \frac{1}{r} \frac{dT}{dr} + \frac{d^2T}{dz^2} \right] + 2\mu \left[1 + \frac{1}{\beta} \right] \left[\frac{r\bar{\mu}}{dr} \right]^2 + \left(\frac{\bar{\mu}}{r} \right)^2 + \left(\frac{d\bar{\omega}}{dz} \right)^2 + \frac{1}{2} \left(\frac{d\bar{\mu}}{dz} + \frac{r\bar{\omega}}{dx} \right)^2 \text{ (9)}$$

Averaged Flow Equation:-

$$\frac{d(\bar{u}+\bar{\mu})}{dr} + \frac{(\bar{u}+\bar{\mu})}{r} + \frac{d(\bar{\omega}+\bar{w})}{dz} = 0 \text{(10)}$$

Using ensemble Average and Condition

$$\overline{uw} = \overline{uw} + \overline{uw}$$

$$\bar{\mu} + \bar{\omega} = \bar{\mu} + \bar{\omega}$$

$$\frac{d\bar{\mu}}{dr} + \frac{\bar{\mu}}{r} \frac{d\bar{\omega}}{dr} + \frac{d\bar{\omega}}{dz} = 0$$

$$\frac{d\bar{\omega}}{dt} = \bar{\mu} \frac{d\bar{\omega}}{dr} + \bar{\omega} \frac{d\bar{\omega}}{dz} = -\frac{1}{e} \frac{dp}{dz} + \frac{6B^2\omega}{p(m^2+1)} (\bar{\omega} - m\bar{\mu}) + \frac{\mu}{e} \left(1 + \frac{1}{\beta} \right) \left[\frac{d\bar{\omega}}{dr^2} + \frac{1}{r} \frac{d^2\omega}{dz^2} \right] - e \frac{d}{dr} (\bar{u}, \bar{w})$$

Numerical Techniques :- Numerical Techniques the Differential equations are Solved by Finite time central space Finite differential Scheme

$$Dw/dt = w_j^{n+1} - w_j^n / \Delta t$$

$$\partial w / \partial t = w_j^{n+1} - w_j^n$$

$$\partial w / \partial x = w_{j+1}^n - w_{j-1}^n / 2\Delta x$$

$$\partial^2 w / \partial x^2 = w_{j+1}^n - w_j^n + w_{j-1}^n / (\Delta x)^2$$

$$\partial \theta / \partial t = \theta_j^{n+1} - \theta_j^n / \Delta t$$

$$\partial \theta / \partial x = \theta_{j+1}^n - \theta_{j-1}^n / 2\Delta x$$

$$\partial^2 \theta / \partial x^2 = \theta_{j+1}^n - \theta_j^n + \theta_{j-1}^n / \Delta x^2$$

Taking in account the blood flow equations will be

$$W(j, n+1) = w(j, n) + \Delta t [p/R_e \{ A_0 + e \cos \omega t + \mu / \mu_p \cdot 1/r(m)^2 (1 + 1/\beta)]$$

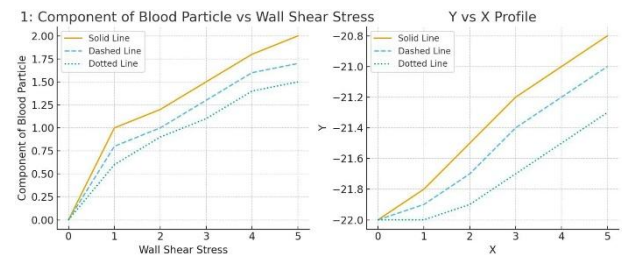
$$W(j+1, n) - w(j, n) + w(j-1, n) + 1/x_j \cdot w(j+1, n) - w(j-1, n) / 2\Delta x + M^2/m^2 w(j, n)$$

With the following conditions

$$W(j, n) = 0 \quad \theta(j, n) = 0 \quad \text{at } t = 0$$

$$W(j+1, n) = w(j, n) \quad \theta(j+1, n) = \theta(j, n) \quad \text{at } x = 0$$

$$W(j, n) = 0 \quad \theta(j, n) = 1 \quad \text{at } x = 1$$



III. RESULTS AND DISCUSSIONS

The velocity profile of blood flow It was observed that blood sticks to the walls resulting in zero velocity at the interface due to viscosity. Stenosis creates a area of resistance of blood flow causing acceleration and high speed at the edges and this acceleration is followed by deceleration down stream of the stenosis,

Value of $\frac{r}{rz}$	Laminar Flow	Turbulent Flow
.1	.35413	.337800
.2	.35413	.357764
.3	.35414	.357812
.4	.35415	.357864
.5	.35416	.357865
.6	.35147	.357895
.7	.35418	.358964
.8	.35419	.358852
.9	.35420	.357891
1.0	.35421	.358893

REFERENCES

- [1] Chaude Perkins (Roses y bank edited by chase Postino in ta bot 10, (2025)3185/thine 2625 1624 143
- [2] N-Suriya (2025) Performance Analipsis of mandatis Pastiches during She Targated drug belissing application of OHAM 1210-723-779
- [3] Dibri J.N(2025) A uttak based correlate of swimming bestormance and foraging behaviour in sown en occurring Jellyfish speeds.
- [4] Journal of Engineering & fritlogy Vol.6 PP-1217-1225
- [5] Suptrotimis (2025) Numerical Investigation of blood trece model ering Reduced onday model with AI All comel Benim, Singapore stringer PP-87-92
- [6] Van Dand Edward R (2025) on turbulent flow Near the wall Journal of Aeronautical scenes 25-11 1007-1011
- [7] Waton Dim and KUB.M (2025): An As model for merkinnies of vasuculer sptem In Annual review of Biomedical Enginesing VolI CBS P.P-235-323
- [8] Zhou, F. (2025) & coronary Artery diameter is muursely Associated with with the severity of coronary leison Inckel Physical biochem us PP. 12.47-1157
- [9] Mirma.m (2025) Numerical investigation of segment with variable stesnesis in am Arterial segment In Journal of molecular liquir 313 P.1353-1373