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Methods to Maximize the well-being and Vitality of Moribund Communities

A. Victor Devadoss[1], D.Ajay [2]
[1]Department of Mathematics, Loyola College, Chennai, Tamil Nadu, India
[2]Email:hanivictor@ymail.com , dajaypravin@gmail.com

Abstract-It has become the primary concern for the governments to chart effective methods and policies to revitalize the communities which are on the verge of extinction, most of which are indigenous. This has become more relevant and important in an era of liberalization, which more often adversely affects the welfare of such communities. In this paper we make an effort to identify and qualify measures that would revitalize moribund communities and to quantify them using fuzzy analysis. We come out with concrete suggestions for the governments and the policy makers which can be easily put in action.

Keywords-vitality, moribund community, Fuzzy, Bidirectional Associative Memories (BAM)

I. INTRODUCTION

Definitions of community are varied, but show three general characteristics: it is a social group, people in it have common activities and experiences, and it occupies a definite territorial area (Hoffer 1931). Therefore we can define a community as a social group of any size whose members reside in a specific locality, share government, and often have a common cultural and historical heritage.

II. COMMUNITY WELLBEING

'Community Well-being' is a concept that refers to an optimal quality of healthy community life, which is the ultimate goal of all the various processes and strategies that endeavour to meet the needs of people living together in communities. It encapsulates the ideals of people living together harmoniously in vibrant and sustainable communities, where community dynamics are clearly underpinned by 'social justice' considerations.

At the highest end of the Community Wellbeing continuum is giving back to society. This may be what differentiates an exceptional life from a good one. When we asked people with thriving wellbeing about the greatest contribution they had made in their life, with few exceptions, they mentioned the impact they have had on another person, group, or community. Not only had these individuals made a substantial contribution to something bigger than themselves, but they also had been recognized for their community involvement. Anyone who wishes to revital the community wellbeing might have two objectives. One, to secure formal recognition of a leading role for local authorities in improving public health across all communities; two, to ensure that community leadership and commissioning roles for local authorities remain at the heart of the government's vision for adult social care.

III. COMMUNITY VITALITY

The study of measuring community vitality is relatively a new subject. Not much research has been done on it. For meaningful development and vitality of the community the emphasis on the quality of life of the community, not just on the economic aspects of it, is clearly important. This is because research has shown that an increase in material well-being over time does not increase the happiness of the people. An increase in income definitely raises the happiness of the people with low income, but stops to do so beyond a certain level.Besides an excessive focus on material development has led to a diminished sense of community in some countries. Here we list a few important factors which decides or helps us to measure the vitality of any community.

A. Giving and volunteering

Giving and volunteering each represent opportunities to care for others that are deeply embedded in the community life. People argue that especially in the context of personal resources and community ties, these two forms of helping represent variant avenues of civic engagement and distinct modes of voluntary action. Volunteering reflects direct engagement in community life and an active community-based civil society. In complement, giving, which is more contingent on personal resources, is indicative of an interest in public concerns through supporting the actions of others. The network is often assumed to be deterministic and state changes are synchronous ie an entire field of neurons is updated at a time Giving then corresponds to a more organizationally centered civil society, encouraged by shared cultural values of helping. Because a responsive democratic environment is sustained by both direct involvement and shared support of public caretakers, understanding the potentially different contexts that facilitate each type of engagement is important in promoting a balanced democracy well equipped to meet public needs.

B. Social cohesion

Emile Durkheim, a great sociologist, argued that a society exhibiting mechanical solidarity is characterized by its cohesion and integration comes from relative homogeneity. And therefore social cohesion is the resultant forces which are acting on the members of a community to stay in a group. A cohesive community becomes one whenthere is a common vision and a sense of belonging for all communities;

- The diversity of people’s different backgrounds and circumstances are appreciated and positively valued;

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- Those from different backgrounds have similar life opportunities; and
- Strong and positive relationships are being developed between people from different backgrounds in the workplace, in schools and within neighborhoods.

C. Familial affection

The role of family in community building is vital. A human being becomes a social being only through the upbringing by the family. The early childhood and the conditions in family play a greater role in making a person a responsible member of the society. Because young children's lives are so embedded in their families and communities, and because research indicates that successful early childhood education depends upon partnerships with families and communities, early childhood professionals need to thoroughly understand and apply their knowledge in this area.

IV. BIDIRECTIONAL ASSOCIATIVE MEMORIES

A. Neuron Fields

A group of neurons forms a field. Neural networks contain many fields of neurons. F_x denotes a neuron field which contains n neurons and F_y denotes a neuron field which contains p neurons.

B. Neuronal Dynamical Systems

The neuronal dynamical system is described by a system of first order differential equations that govern the time evaluation of the neuronal activations or membrane potentials.

where x_i and y_j denote respectively the activation time function of the ith neuron in F_x and the jth neuron in F_y. The over dot denotes time differentiation, g_i and h_j are functions of X, Y etc. where $X(t) = (x_1(t),\ldots\ldots,x_n(t))$, $Y(t) = (y_1(t),\ldots\ldots,y_n(t))$ define the state of the neuronal dynamical system at time t. Additive bivalent Models describe asynchronous and stochastic behavior. At each moment each neuron can randomly decide whether to change state, or whether to omit a new signal given its current activation. The BAM is a non- adaptive, additive, bivalent neural network.

C. Bivalent Additive BAM

In neural literature, the discrete version of the earlier equations are often refered to as the Bidirectional Associative Memories

$$\dot{X}_i = g_i(X, Y, \ldots) \quad , \quad \dot{Y}_j = h_j(X, Y, \ldots)$$

or BAMs. A discrete additive BAM with threshold signal

$$x_i^{k+1} = \sum_j^p S_j(y_j^k) m_{ij} + I_i$$

$$y_j^{k+1} = \sum_i^n S_i(y_i^k) m_{ij} + I_j$$

functions, arbitrary thresholds and inputs, an arbitrary but a constant synaptic connection matrix M and discrete time stepsK are defined by the equations.

D. Synaptic connection Matrices

Let us suppose that the field F_x with n neurons is synaptically connected to the field F_y with p neurons. Let m_{ij} be a synapse where the axon from the ith neuron in F terminates, m_{ij} can be positive, negative or zero. The synaptic matrix M is a n X p matrix of real numbers whose entries are the synaptic efficacies m_{ij}. The matrix M describes the forward projections from the neuronal field F_x to the neuronal field F_y . Similary, M^T, a p X n synaptic matrix and describes the backward projections F_y to F_x.

a) Unidirectional Networks
These kinds of networks occur when a neuron synoptically interconnects to itself. The matrix N is n X n square matrix.
b) Bidirectional Networks
A network is said to be a bidirectional network if $M = N^T$ and $N = M^T$

E. Bidirectional Associative Memories

When the activation dynamics of the neuronal fields F_x and F_y lead to the overall stable behavior, the bi-directional networks are called as Bi-directional Associative Memories or BAM. A unidirectional network also defines a BAM if M is symmetric ie M = M.

F. Additive Activation Models

An additive activation model is defined by a system of n + p coupled first-order differential equations that interconnects the fields F_x and F_y through the constant synaptic matrices M and N described earlier. $S_i(x_i)$ and $S_j(y_j)$ denote respectively the signal function of the ith neuron in the field F_x and the signal function of the jth neuron in the field F_y . Discrete additive activation models correspond to neurons with threshold signal functions. The neurons can assume only two values ON and OFF. On represents the signal value + 1 and OFF represents 0 or -1 (-1 when the representation is bipolar) The bipolar version of these equations yield the signal value -1 when $x_i < U_i$ or $y_j < Vj$.

The bivalent signal functions allow us to model complex asynchronous state-change patterns. At any moment different neurons can decided whether to compare their activation to their threshold. A each moment any of the 2^n subsets of F_x neurons or the 2^p subsets of the Fy neurons can decide to change state. Each neuron may randomly decide whether to check the threshold conditions in the equations given above. At each moment each neuron defines a random variable that can assume the value ON (+1) or OFF (0 or -1). The network is often assumed to be deterministic and state changes are synchronous ie an entire field of neurons is updated at a time. In case of simple asynchrony only one neuron makes a state change decision at a time.

When the subsets represent the entire fields Fx and F_y synchronous state change results.In a real life problem the entries of the constant synaptic matrix M depends upon the investigator's feelings. The synaptic matrix is given a weight

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age according to their feelings. If x F_x and y F_y the forward projections from F_x to F_y is defined by the matrix M.:

$\{ P(x_I, x_j)\} = M$, $1<I<n$, $1<j<p$.

The backward projections is defined by the Matrix $M^{T.}$:

$\{ F(y_j, x_I)\} = (m_{ij}) = M^T$, $1< I < n$, $I<j<p$.

G. Bidirectional Stability

All BAM state changes lead a fixed-point stability. This property holds for synchronous as well as asynchronous state changes. A BAM system (F_x, F_y, M) is bi drectionally stable if all inputs converge to fixed pint equilibria. Bidirectional stability is a dynamic equilibrium. The same signal information flows back and forth in a bi directional fixed point.The fixed point of a bidirectional system is time dependent. The fixed point for the initial input vectors can be attained at different times which is illustrated later. Based on the synaptic matrix M which is developed by the investigators feelings, the time at which bi directional stability is attained also varies accordingly.

V. ADAPTATION OF THE PROBLEM TO BAM

The attributes connected with the vitality of the community are:

$$\dot{x}_i = -A_i x_i + \sum_j^p S_j(y_j^k) m_{ji} + I_i$$

$$\dot{y}_j = -A_j y_j + \sum_i^n S_i(y_i^k) m_{ij} + I_j$$

G_1: Giving and volunteering
This represents the opportunity to care for the needs of the others and therefore becomes the heart of the community life.
G_2: Social cohesion
One's attachment and sense of belonging to his/her community
G_3: Participation in the community activities
To involve in the activities keeps people active members of the community
G_4: The role of Family
The basic unit of community building, families which are involved and situated in the geographical area of the community.
G_5: Duration of stay in the community
The number of times or occasions one stays active in the community, one's willingness to come back to his/her community.
G_6: Safety
The social security assured to the community through constitutional means, by traditional practice or any other means.

The attributes connected with the well-being of the community are:
F_1: Economic well-being
The income, expenditure, household, land, etc. of the members of the community.
F_2: Social status
The dignity and respect that the members of the community enjoy among other communities.
F_3: Happiness
The state of psychological wellness, satisfaction in life, the habit of being content.
F_4: Preservation of traditional values
The community's urge to preserve those values that serve as the identity of the community.
F_5: Community health
Physical and physiological wellness indicated through satisfactory health indices such as hygiene, proper medication, availability of health centres and aids.
F_6: Move towards modernity
The availability of access to modern accessories and an urge to inculcate modern values.
F_7: Traditional rights of the community

The rights enjoyed by the community traditionally and guaranteed to it through constitution *and by practice.*
The 6x7 matrix represents the forward synaptic projections from the neuronal field F_x to F_y. The 7x6 matrix represents the backward synaptic projections from F_y to F_x .Now taking F_x along the rows and F_y along the columns, we get the synaptic connection matrix which is moduled on the scale [-5, 5].

$$M_1 = \begin{pmatrix} 4 & 0 & 5 & -2 & 3 & -2 & 3 \\ 3 & 4 & 5 & 2 & 3 & -3 & 3 \\ 3 & 1 & 4 & 3 & 3 & -5 & 2 \\ 3 & 4 & 3 & 5 & 3 & 0 & 2 \\ 1 & -2 & 4 & 3 & 4 & -3 & 2 \\ 5 & 4 & 4 & -4 & 3 & -5 & 0 \end{pmatrix}$$

Let X_k be the input vector given as (-5 4 1 4 -2 -3) at the kth time period in which we take the attributes Social cohesion, Participation in the community activities and The role of Family in ON stage and the rest in OFF stage.

The binary signal vector is given as
$S(X_k) = (0\ 1\ 1\ 1\ 0\ 0)$
From the activation equation
$S(X_k).M = (9\ 9\ 12\ 10\ 9\ -8\ 7) = y_{k+1}$
$S(y_{k+1}) = (1\ 1\ 1\ 1\ 1\ 0\ 1)$
$S(y_{k+1}).M_1^T = (13\ 20\ 16\ 20\ 12\ 12) = y_{k+2}$
$S(y_{k+2}) = (1\ 1\ 1\ 1\ 1\ 1)$
$S(y_{k+2}).M_1 = (1\ 1\ 1\ 1\ 1\ -3\ 1) = y_{k+3}$
$S(y_{k+3}) = (1\ 1\ 1\ 1\ 1\ 0\ 1)$

Thus the binary pair {(0 1 1 1 0 0), (1 1 1 1 1 0 1)} represents a fixed point of the dynamical system. Equilibrium of the system has occurred at k+3rd time period, which implies that when we keep G_2, G_3 and G_4 in ON state the dynamical system pushes all the attributes except F_6 to ON state.

VI. CONCLUSION

There is an increasing trend on measuring the vitality of communities and to revital moribund communities. This paper which has analyzed the factors that contribute to this effort suggests what are the attributes or methods that one has to engage towards this noble effort. The community wellbeing can best be increased through concentrating more on personal involvement of the members of the community. This can be emphasized through participation in the community activities,

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socialization through families and one's duration of stay in the community. Secondly, the vitality of the community depends more of its identity. Hence importance should be given to the traditional rights of the community and the security and dignity guaranteed to it.

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