

**2002 International Joint Conference  
on Neural Networks  
Vol.3 (B)**

**Proceedings of the  
2002 International Joint Conference  
on Neural Networks**

**IJCNN'02**

May 12 – 17, 2002  
Hilton Hawaiian Village Hotel  
Honolulu, Hawaii

江苏工业学院图书馆  
藏书章

**Co-sponsored by**

Institute of Electrical and Electronics Engineers (IEEE)

IEEE Neural Networks Society (NNS)

International Neural Network Society (INNS)

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| Tokushima, Hisao .....      | 1080            |
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| Tsoi, A.C. ....             | 1918            |
| Tsuji, Kazuo.....           | 1995            |
| Tsushio, Kenji.....         | 1986            |
| Tsuzuki, T. ....            | 1013            |
| Tsuzuki, Takeo .....        | 709             |
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| Wang, Jiaqi .....      | 571              |
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| Watts, Michael         | 189                    |
| Wee, C.Y.              | 1013                   |
| Wei, Chengjian         | 659                    |
| Wei, Wu                | 507                    |
| Weng, Juyang           | 2012                   |
| Weng, Ruby C.          | 2387                   |
| Wermter, Stefan        | 29                     |
| Wesolkowski, Slawo     | 2363                   |
| Wettayaprasit, Wiphada | 1730                   |
| White, John A.         | 1661                   |
| Wilamowski, Bogdan M.  | 1463, 1528, 1820, 2327 |
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| Woods, W.              | 1120                   |
| Wu, Aiming             | 2819                   |
| Wu, Gaowei             | 571                    |
| Wu, Jianxin            | 1411                   |
| Wunsch II, Donald C.   | 300, 2029              |
| Wunsch, D.C.           | 1720, 1802, 2866       |

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| Xu, L.       | 472             |
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| Xu, Peng     | 2076            |
| Xu, Rui      | 300             |
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| Yamamoto, Toru       | 968, 1690 |
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| Yamazaki, A.         | 547       |
| Yang, Chin-Wen       | 822       |
| Yang, Chun-Chieh     | 1385      |
| Yang, Shuyu          | 2662      |
| Yang, Simon X.       | 794       |
| Yang, Yanli          | 2638      |
| Yang, Z.             | 1946      |
| Yanjun, Yan          | 2150      |
| Yao, Xin             | 221       |
| Yap, P.T.            | 908       |
| Yaping, Huang        | 773       |

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| Yasui, Syozo        | 1305             |
| Yasunaga, Moritoshi | 2270             |
| Yee, Liew Pol       | 1439, 1455, 1459 |
| Yegnanarayana, B.   | 613, 1252        |
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| Yin, Hujun          | 1906             |
| Yingjian, Qi        | 773              |
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| Yoshida, Hidemasa   | 583              |
| Yoshida, Yoshikazu  | 1281             |
| Yoshihara, Ikuo     | 280, 1056, 2270  |
| Yoshizawa, Shuji    | 1655             |
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| Yu, Chien-Cheng     | 1218             |
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| Zakrzewski, Radoslaw R. | 2632       |
| Zarader, J.L.           | 852        |
| Zaverucha, Gerson       | 2416       |
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| Zeng, Xinchuan          | 913        |
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| Zhang, Jie              | 828        |
| Zhang, L.               | 840        |
| Zhang, Peisen           | 290        |
| Zhang, Qinghua          | 794        |
| Zhang, Sheng            | 956        |
| Zhang, Tieling          | 382        |
| Zhang, Wan              | 239        |
| Zhang, Y.               | 2470       |
| Zhang, Yan-Qing         | 553        |
| Zhang, Yi               | 507        |
| Zhang, Yifeng           | 659        |
| Zhang, Yilu             | 2012       |
| Zhang, Yunong           | 41         |
| Zhao, Qiangfu           | 221        |
| Zhao, Qingjie           | 873        |
| Zhao, Wenbo             | 102, 1086  |
| Zheng, Qi-lun           | 541        |
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| Zimmerman, Alejandro s. .... | 1581                  |
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# **Utilization of Neural Networks for the Construction of an Intelligent Internet Communication System Which Introduces a User an Appropriate New Mail Friend in a Sophisticated Way**

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**Abstract** – In this paper, a system for introducing a new mail friend which utilizes ANNs is developed. ANNs are utilized in order to introduce a user a new mail friend whose tastes for hobbies are considerably different from him. Several computer simulation results confirm the effectiveness of the proposed system.

## **I. INTRODUCTION**

The recent spread of the technologies utilizing the Internet has greatly changed our living environment. The basic structure of the industry has also been greatly changed by the penetration of Internet Technology.

In this paper, we shall propose an intelligent internet communication system which introduces a user an appropriate new mail friend in a sophisticated way. In our proposed system, neural networks are utilized in order to introduce a user a new mail friend who could be an appropriate new mail friend to him and whose hobbies are completely different from those of him.

The outline of this paper is as follows. In the second section, following a brief explanation concerning the neural network model, input variables, etc., we will propose a new mail friend introducing system which utilizes neural networks. In the third section, we will give several computer simulation results. Finally, the paper concludes with a summary.

## **II. APPLICATION OF ANNS FOR CONSTRUCTING AN INTELLIGENT SYSTEM WHICH INTRODUCES A NEW MAIL FRIEND IN A SOPHISTICATED WAY**

In this section, we shall propose an intelligent system utilizing ANNs which introduces a new mail friend in a sophisticated way. First of all, let us briefly touch upon the neural network model and input variables.

### **A. Neural Network Model and Input Variables**

Fig.1 shows the neural network model which consists of the 23 input units, one hidden layer having 30 units, and 23 output units. As inputs into the neural network model, we have chosen the 23 variables which characterize the personal hobbies of the user. The reason we have chosen the neural network model of 23\*30\*23 type is to introduce a user a new mail friend who may be able to be a new mail friend for him having considerably different tastes for hobbies.

### **B. Teacher Signal**

The main objective of this research is to construct a system using neural networks which can introduce a user a person who may be able to be a new mail friend whose tastes for hobbies are considerably different from him. In order to let the neural network be capable of having such a mechanism, we first should try to collect data for training neural networks. The data which we have used for neural network training have been chosen as follows:

We have asked 30 people to answer the questionnaire concerning their tastes for hobbies. We have also asked each of them to hand his mail friends same questionnaires and request answering. Since each of the 12 hobbies of a user is represented as a scalar or 2-dimensional vector as shown from Fig.2 (a) to Fig. 2 (c), his overall taste for hobbies can be represented as 23 dimensional vector.

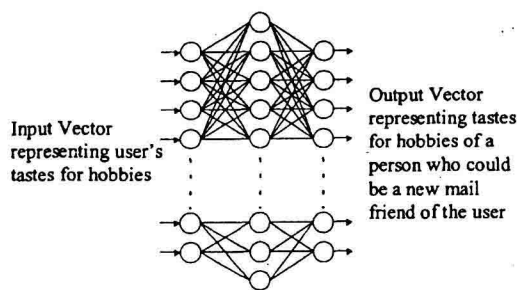


Fig. 1 Neural Network Model

By calculating the Euclidean distance between the vector representing tastes for hobbies of the user and those of his mail friends, we can identify one of his mail friends whose tastes for hobbies are most different from those of him. Since we have asked 30 users to collect data, we can utilize 30 pairs of 23 dimensional vector representing tastes for hobbies for the training data.

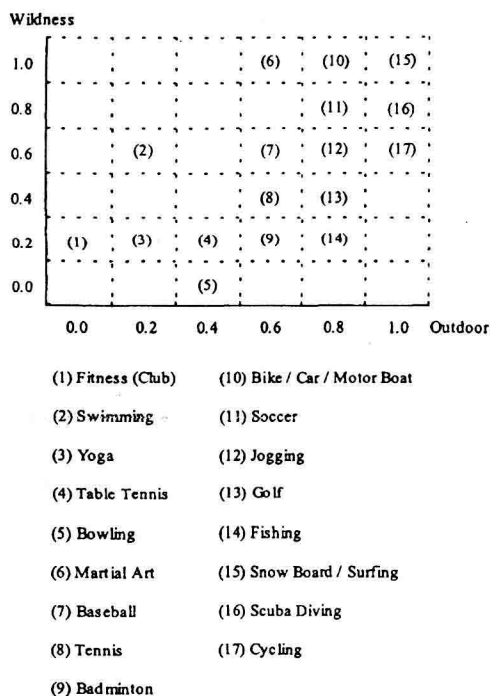


Fig. 2 (a) 2 - Dimensional Representation of the Hobby (Sports)

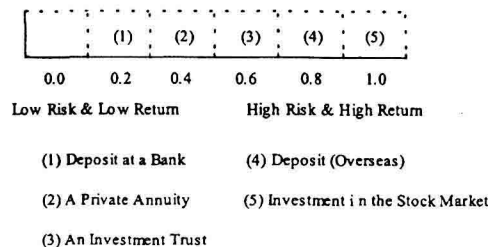


Fig. 2 (b) One Dimensional Representation of the Hobby (Money)

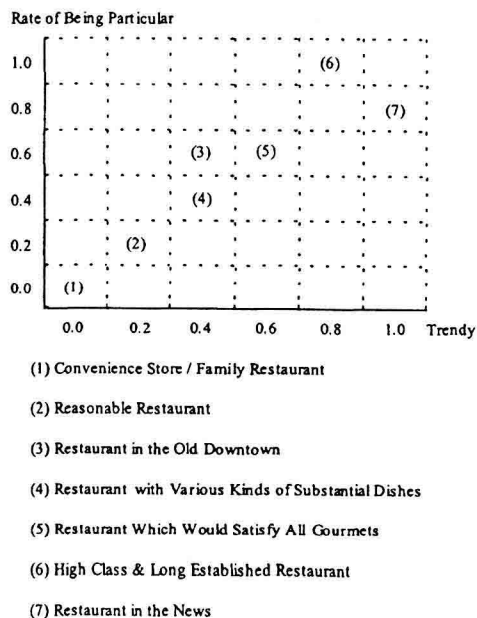


Fig. 2 (c) 2 - Dimensional Representation of the Hobby (Gourmet)

### C. Neural Network Training

Neural network training is carried out with the objective

for letting the neural network model emit output whose Euclidean distance with the teacher signal<sup>1</sup> is small. Our system utilizes the modified BP method with momentum [1] & the Hybrid Algorithm [5][6].

#### D. Introduction of a New Mail Friend

By inputting into the trained neural network model a data concerning user's tastes for hobbies, we can get the output which reflects the tastes for hobbies that are considerably different from those of the user but also reflects the tastes for hobbies of a person who may be able to be a good mail friend for the user.

The proposed system introduces a new mail friend by finding out the 23 dimensional vector whose Euclidean distance with that consisting of the outputs from the neural network model is the smallest among the candidates registered (Fig.3 illustrates this process).

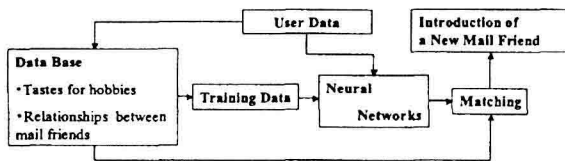


Fig.3 Outline of the Proposed Mail Friend Introducing System

### III. COMPUTER SIMULATION RESULTS

In order to check whether the proposed system can introduce an appropriate new mail friend to a user, we have asked 30 people to submit data concerning tastes for hobbies of their mail friends together with data concerning those of them. Since the objective of the proposed system is to introduce a user a new mail friend whose tastes is considerably different from him and who could be a mail friend to him, we utilized the data (concerning mail friends) where at least 3 pairs of the data were included. A modified BP method with momentum has been utilized for neural network training. When the value of the total error function has decreased below 1/30 of its initial value, we stopped neural network training.

We have obtained the following 2 computer simulation results. The changes of the total error function is shown in Fig. 4.

<sup>1</sup> 23 dimensional vector representing the tastes for hobbies of the user's mail friend whose hobbies are most different from those of the user.

#### I) Computer Simulation Result 1

Data of the main hobbies of the user:

Fashion (Free), Gourmet (Highest Class, Restaurant), Travel (Gorgeous), Sports (Tennis), Watching Sports (Tennis), Career (Realizing Dreams), Hobbies (Amusement Park, Personal Computer, Fortune-Telling, Animation), Beauty & Health (Diet, Make up, Hairstyle)

Data of the Introduced Mail Friend:

Fashion (Casual), Gourmet (Restaurant in the News), Travel (Bargain Price), Career (Freelance), Hobbies (Drive, Photo...), Sports (Baseball, Fishing, Fitness, Motorbike), Watching Sports (Baseball, Figure Skating, Volleyball), Beauty & Health (Diet, Hairstyle), Money (Investing for Stoke Market), Overseas (Strong Desire for Emigration to a Foreign Country, Strong Desire for Studying Overseas)

#### II) Computer Simulation Result 2

Data of the main hobbies of the user:

Fashion (Casual), Gourmet (Restaurant in the Old Downtown), Travel (Basic, Bargain Price), Career (Realizing Dreams, Step Up), Hobbies (Drive, Gardening, Photo, Zoo, ...), Sports (Swimming, Skiing, Badminton, Bowling), Watching Sports (Figure Skating, Volley Ball), Money (Saving, Deposit at an Overseas Bank), Overseas (Strong Desire for Emigration to a Foreign Country, Strong Desire for Traveling Overseas for a Short Period)

Data of the Introduced Mail Friend:

Travel (Bargain Price), Career (Corporate Soldier), Hobbies (Drive, Personal Computer, Game, Gambling), Sports (Golf, Snow Board), Watching Sports (Baseball, Soccer, Golf)