

System Framework of Livestock Disease Forecasting based on Cloud

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Abstract. This paper proposed livestock disease forecasting system framework based on cloud to minimize damage from livestock disease. Proposed system can exactly analyze livestock disease based on livestock activity amount, temperature, symptom along with disease, and environmental information utilizing cloud and prevent disease diffusion beforehand. Also, through comparative analysis of information data collected from measurement equipment per farmhouse by comprehending temperature of livestock and activity amount and provide diagnosis service of whether of disease and monitoring service for livestock breeding farmhouse to enable quick primary action. Through, this paper aimed at improving productivity of livestock breeding farmhouse and minimizing damage from livestock disease.

1 Introduction

Number of domestic livestock breeding farmhouse is consistently decreasing during the last 10 years. Production amount of livestock products has been stagnant since foot-and-mouth outbreak in 2011, after 'the peak in 2010', overseas dependence of our national economy has risen due to FTA settlement, accordingly, items that have rapid increase of import or export appeared in livestock products field, therefore, unexpected expectation and anxiety are heightened. Also, due to climate change, malignant livestock diseases such as foot-and-mouth, Parvovirus infection, Japanese encephalitis, infectious diarrhea, reproductive respiratory syndrome, proliferation growth syndrome, etc. have frequently occurred, therefore, economic and social damage is rapidly increasing.

Livestock disease causes huge damage up to the level of mental and economic disaster once it occurs. In case of domestic livestock industry, hundreds of thousand cows and millions of pigs were buried alive due to the outbreak of foot-and-mouth in 2010. In order to minimize damage from malignant livestock disease that has high fatality and transmission speed once it occurs, above all, primary disease control is important, i.e. to discover disease in early stage by enhancing prior forecasting and rapidly reacting. In order to solve the problem of livestock disease as this, it is

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necessary to always prepare a pleasant livestock environment through real-time monitoring.[1]

Forecasting system that was researched to solve this problem has forecasting members who exert efforts in current forecasting system such as sample inspection, foot-and-mouth serum inspection, etc., however there's a limitation to raise efficiency due to lack of forecasting manpower.[2]

Therefore, this paper proposed livestock disease forecasting system to minimize livestock damage due to disease by exactly analyzing livestock disease and prevent disease spread beforehand through utilizing cloud based on livestock activity amount, temperature information, symptom along with disease, and environment information. Quick primary measure can be conducted by diagnosing whether of livestock disease and quick monitoring at livestock farmhouse through comparative analysis in cloud by utilizing data information collected from measurement equipment per each farmhouse through comprehending temperature and activity amount along with livestock disease type. Also, through this, this paper aimed at improving productivity of livestock farmhouse and minimizing damage[3][4].

This paper was composed as follows. Chapter 2 explained proposed disease forecasting system framework design based on cloud. Conclusion explained problem solution and henceforth direction through cloud base disease forecasting system framework.

2 Cloud-based disease forecasting system framework

2.1 Farmer profile for livestock disease forecasting

This system can be executed in the house connected to the Internet. Therefore, network environment with farmer can be different according to farmer, also, monitoring device such as mobile and tablet PC can be different per farmer. Therefore, consideration on this matter is required. Table 1 indicates Model profile farmer for livestock disease forecasting.

Table 1. Model profile farmers for livestock disease forecasting

Main Category	Subcategories	Component
Visitor information	Farmer information	ID
		Name
		age
		Sex
	Access environmental information	Time
		Network Speed
Use device		
Livestock Information	Entity Information Services	Sex
		Date of birth
		Vaccination Date
		Disease
	Disease forecasting information services	Body Temperature
		Activity
		Sound

2.2 A cloud-based environment, disease forecasting and Entity Framework

Figure 1 is Cloud-based disease forecasting service architecture. This paper proposed SaaS structure in disease forecasting system for cloud environment. Here, this paper put farmer, individual information service, and disease forecasting service in disease forecasting framework. Farmer information has a function of searching and providing disease forecasting center, disease forecasting service takes a role of managing individual temperature, activity amount, and sound. Also, individual information service manages individual information, and has information such as gender of individual that the farmer owns, date of birth, vaccination date, and whether of disease.

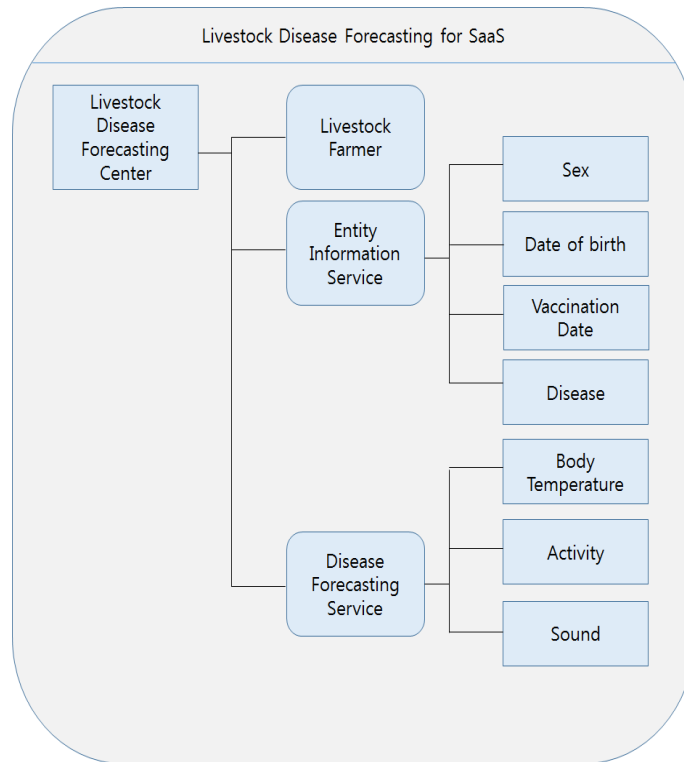


Fig. 1. Cloud-based disease forecasting services architecture (SaaS)

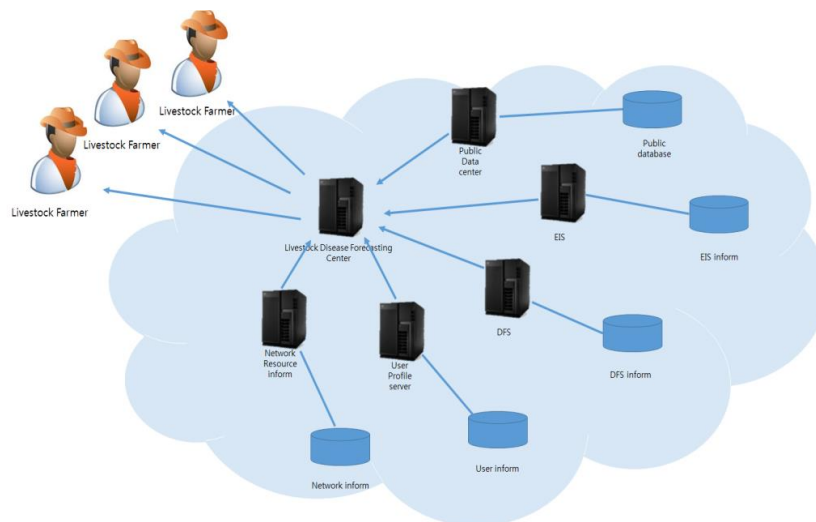


Fig. 2. Disease forecasting system environment

Based on this, Figure 2 shows cloud base disease forecasting environment. Network Resource inform is a place to save and manage network resource, which manages network system environment that the farmer approaches for monitoring and supports the farmer to more efficiently use disease forecasting monitoring through system virtualization. User profile server manages individual information of farmer, saves and manages age, gender, and name, etc. of farmer. Since individual characteristic owned by farmer is different each other, disease forecasting effect also considers farmer's monitoring equipment or network environment. EIS saves and manages individual information, and DFS manages disease forecasting information. Also, Public data center is used for individual information sharing, which saves and manages general individual information.

3 Conclusion

This paper proposed a framework for disease forecasting support service considering cloud computing environment in disease forecasting system. For prior disease forecasting to minimize damage from malignant livestock disease that has high infectiousness, quick detection and measure are important, however, lack of manpower in current disease forecasting system and inefficiency of information collection were settled with proposed cloud base livestock disease forecasting system framework through quick monitoring. Therefore, even the farmhouses with insufficient professional knowledge can prevent damage spread by detecting livestock disease in the early stage, since disease forecasting is available. Also, in the place where the Internet is connected, disease forecasting monitoring can be performed with various equipment. As future paper, it is necessary to expand framework in order to completely compose livestock individual information or disease forecasting service in cloud environment by considering each factor of structure in PaaS, IaaS classes, along with SaaS.

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