CLAIMS

What is claimed is:

1. A computer-implemented method for predicting a port-stay duration of a vessel at a port using at least one processor, the method comprising:

determining a plurality of port-stay components of the port-stay duration, the plurality of port-stay components comprising a first port-stay component and a plurality of second port-stay components;

determining a regression sequence of the plurality of port-stay components, comprising:

modeling the first port-stay component to obtain a modeled first port-stay component, and modeling each of the plurality of second port-stay components to obtain a plurality of modeled second port-stay components,

determining a relative measure associated to each of the plurality of second port-stay components by modeling each of the plurality of modeled second port-stay components based on a first criterion based on R-square, and

determining the regression sequence of the plurality of port-stay components based on the relative measure associated to each of the plurality of second port-stay components;

modeling each of the plurality of port-stay components in sequence in accordance with the regression sequence determined to obtain a first plurality of sequentially modeled port-stay components;

modeling a first port-stay duration based on the first plurality of sequentially modeled port-stay components to obtain a first port-stay duration model; and

predicting the port-stay duration based on the first port-stay duration model.

2. The method of claim 1, wherein the relative measure indicates a proportion of a variability of each of the plurality of modeled second port-stay components modeled by at least one of the first modeled port-stay component and other modeled second port-stay components and one or more of a plurality of predefined port-stay factors.

~~3. The method of claim 1, wherein the first criterion is based on R-square.~~

43. The method of claim 1, wherein said determining the regression sequence of the plurality of port-stay components based on the relative measure associated to each of the plurality of second port-stay components further comprises assigning a second port-stay component associated to a highest relative measure amongst the plurality of second port-stay components a first order amongst the plurality of second port-stay components in the regression sequence.

~~5~~4. The method of claim 1, wherein said modeling the first port-stay component to obtain a modeled first port-stay component, and modeling each of the plurality of second port-stay components to obtain a plurality of modeled second port-stay components further comprises modeling each of the plurality of second port-stay components based on the modeled first port-stay component.

~~6~~5. The method of claim 1, wherein said modeling each of the plurality of port-stay components in sequence in accordance with the regression sequence comprises:

modeling the first port-stay component based on one or more of a plurality of predefined port-stay factors determined based on historical data to obtain a modeled first port-stay component of the first plurality of sequentially modeled port-stay components; and

modeling, for each of the plurality of second port-stay components, the second port-stay component based on a factor derived from an immediate preceding modeled port-stay component of the first plurality of sequentially modeled port-stay components in the regression sequence and one or more of the plurality of predefined port-stay

factors.

~~7~~6. The method of claim 1, wherein said determining the regression sequence of the plurality of port-stay components further comprises:

determining relationships among the plurality of second port-stay components based on a second criterion, and

determining the regression sequence of the plurality of port-stay components based on the relationships among the plurality of second port-stay components.

~~8~~7. The method of claim 1, wherein:

the first port-stay component is a working hour component, and modeling the first port-stay component comprises modeling the working hour component based on one or more of a plurality of predefined port-stay factors; and

the plurality of second port-stay components are non-working hour components, and modeling the plurality of second port-stay components comprises modeling the non-working hour components based on the modeled working hour component and one or more of the plurality of predefined port-stay factors.

~~9~~8. The method of claim 1, wherein:

at least one of the plurality of second port-stay components is a weather-based non-working hour component, and modeling each of the plurality of port-stay components in sequence in accordance with the regression sequence determined to obtain the first plurality of sequentially modeled port-stay components comprises modeling each of the plurality of port-stay components including the weather-based non-working hour component in sequence, and further comprising:

modeling the plurality of port-stay components in sequence in accordance with the regression sequence without the weather-based non-working hour component to obtain a second plurality of sequentially modeled port-stay components;

modeling a second port-stay duration based on the second plurality of sequentially modeled port-stay components to obtain a second port-stay duration model; and

predicting the port-stay duration using a weighted average determined based on the first port-stay duration model and second port-stay duration model.

~~10~~9. The method of claim 1:

wherein at least one of the plurality of second port-stay components is a weather-based non-working hour component; and

further comprising modeling the weather-based non-working hour component using historical data of non-working hours due to weather in a first time instance prior to arrival of the vessel, and modeling the weather-based non-working hour component using the historical data of non-working hours due to weather and weather forecast data in a second time instance prior to arrival of the vessel, the first time instance having a time period further away from arrival of the vessel relative to the second time instance.

~~11~~10. A system for predicting a port-stay duration of a vessel at a port, the system comprising:

a memory; and

at least one processor communicatively coupled to the memory and configured to:

determine a plurality of port-stay components of the port-stay duration, the plurality of port-stay components comprising a first port-stay component and a plurality of second port-stay components;

determine a regression sequence of the plurality of port-stay components, comprising:

modeling the first port-stay component to obtain a modeled first port-stay component, and modeling each of the plurality of second port-stay components to obtain a plurality of modeled second port-stay components,

determining a relative measure associated to each of the plurality of second port-stay components by modeling each of the plurality of modeled second port-stay components based on a first criterion based on R-square, and

determining the regression sequence of the plurality of port-stay components based on the relative measure associated to each of the plurality of second port-stay components;

model each of the plurality of port-stay components in sequence in accordance with the regression sequence determined to obtain a first plurality of sequentially modeled port-stay components;

model a first port-stay duration based on the first plurality of sequentially modeled port-stay components to obtain a first port-stay duration model; and

predict the port-stay duration based on the first port-stay duration model.

~~12~~11. The system according to claim ~~11~~10, wherein the relative measure indicates a proportion of a variability of each of the plurality of modeled second port-stay components modeled by at least one of the first modeled port-stay component and other modeled second port-stay components and one or more of a plurality of predefined port-stay factors.

~~13~~12. The system according to claim ~~11~~10, wherein said determine the regression sequence of the plurality of port-stay components based on the relative measure associated to each of the plurality of modeled second port-stay components further comprises assigning a second port-stay component associated to a highest relative measure amongst the plurality of second port-stay components a first order amongst the plurality of modeled second port-stay components in the regression sequence.

~~14~~13. The system according to claim ~~11~~10, wherein said modeling the first port-stay component to obtain a modeled first port-stay component, and modeling each of the plurality of second port-stay components to obtain a plurality of modeled second port-stay components further comprises modeling each of the plurality of second– port-stay components based on the modeled first port-stay component.

~~15~~14. The system according to claim ~~11~~10, wherein said model each of the plurality of port-stay components in sequence in accordance with the regression sequence comprises:

modeling the first port-stay component based on one or more of a plurality of predefined port-stay factors determined based on historical data to obtain a modeled first port-stay component of the first plurality of sequentially modeled port-stay components; and

modeling, for each of the plurality of second port-stay components, the second port-stay component based on a factor derived from an immediate preceding modeled port-stay component of the first plurality of sequentially modeled port-stay components in the regression sequence and one or more of the plurality of predefined port-stay factors.

~~16~~15. The system according to claim ~~11~~10, wherein said determine the regression sequence of the plurality of port-stay components further comprises:

determining relationships among the plurality of second port-stay components based on a second criterion, and

determining the regression sequence of the plurality of port-stay components based on the relationships among the plurality of second port-stay components.

~~17~~16. The system according to claim ~~11~~10, wherein:

the first port-stay component is a working hour component, and modeling the first port-stay component comprises modeling the working hour component based on one or more of a plurality of predefined port-stay factors; and

the plurality of second port-stay components are non-working hour components, and modeling the plurality of second port-stay components comprises modeling the non-working hour components based on the modeled working hour component and one or more of the plurality of predefined port-stay factors.

~~18~~17. The system according to claim ~~11~~10, wherein:

at least one of the remaining port-stay components is a weather-based non-working hour component, and

model each of the plurality of port-stay components in sequence in accordance with the regression sequence determined to obtain a first plurality of sequentially modeled port-stay components comprises modeling each of the plurality of port-stay components including the weather-based non-working hour component in sequence; and the at least one processor is further configured to

model the plurality of port-stay components in sequence in accordance with the regression sequence without the weather-based non-working hour component in sequence to obtain a second plurality of sequentially modeled port-stay components;

model a second port-stay duration based on the second plurality of sequentially modeled port-stay components to obtain a second port-stay duration model; ~~-~~and

predict the port-stay duration using a weighted average determined based on the first port-stay duration model and second port-stay duration model.

~~19~~18. The system according to claim ~~11~~10, wherein:

at least one of the plurality of second port-stay components comprise a weather-based non-working hour component, and the at least one processor is further configured to

model the weather-based non-working hour component using historical data of non-working hours due to weather in a first time instance prior to arrival of the vessel, and model the weather-based non-working hour component using the historical data of non-working hours due to weather and weather forecast data in a second time instance prior to arrival of the vessel, the first time instance having a time period further away from arrival of the vessel relative to the second time instance.

~~20~~19. A computer program product, embodied in one or more non-transitory computer-readable storage mediums, comprising instructions executable by at least one processor to perform a method for predicting a port-stay duration of a vessel at a port, the method comprising:

determining a plurality of port-stay components of the port-stay duration, the plurality of port-stay components comprising a first port-stay component and a plurality of second port-stay components;

determining a regression sequence of the plurality of port-stay

components, comprising:

modeling the first port-stay component to obtain a modeled first port-stay component, and modeling each of the plurality of second port-stay components to obtain a plurality of modeled second port-stay components,

determining a relative measure associated to each of the plurality of second port-stay components by modeling each of the plurality of modeled second port-stay components based on a first criterion based on R-square, and

determining the regression sequence of the plurality of port-stay components based on the relative measure associated to each of the plurality of second port-stay components;

modeling each of the plurality of port-stay components in sequence in accordance with the regression sequence determined to obtain a first plurality of sequentially modeled port-stay components;

modeling a first port-stay duration based on the first plurality of sequentially modeled port-stay components to obtain a first port-stay duration model; and

predicting the port-stay duration based on the first port-stay duration model.