Exhibit A

US007689617B2

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(54) **DYNAMIC LEARNING FOR NAVIGATION SYSTEMS**

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(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 305 days.

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(65) **Prior Publication Data**

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Related U.S. Application Data

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(51) **Int. Cl.**
G06F 7/00   (2006.01)
G06F 17/30   (2006.01)
(52) **U.S. Cl.** **707/737**; 707/749; 707/756
(58) **Field of Classification Search** .... None
See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

2005/0055344 A1 *   3/2005   Liu et al. 707/3

OTHER PUBLICATIONS

Belew, "Adaptive Information Retrieval: Using a connectionist representation to retrieve and learn about documents", Proceedings of the 12th annual international ACM SIGIR conference on Research and development in information retrieval, pp. 11-20, ACM, 1989.*

* cited by examiner

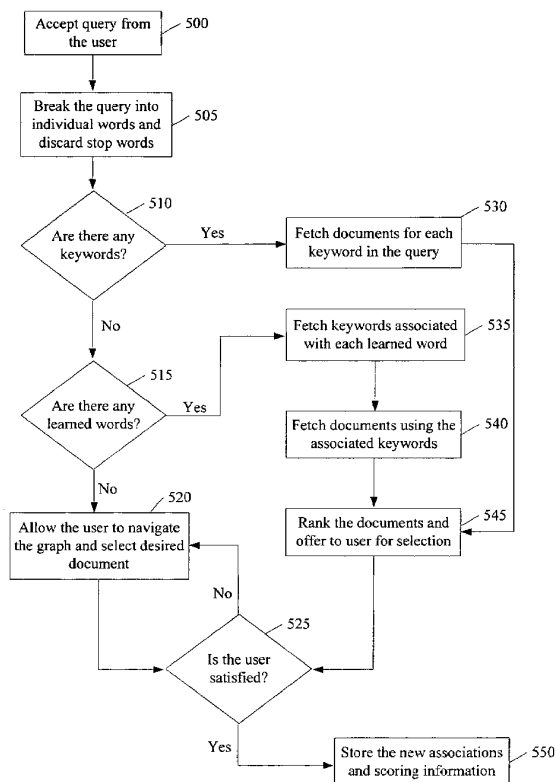*Primary Examiner*—Neveen Abel Jalil
Assistant Examiner—Michael J Hicks
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(57) **ABSTRACT**

A method performed in a system involves, at a node within the system, receiving an input from a user, determining that the input contains an unknown word, presenting at least one response to the user, and based upon at least one additional input from the user, learning one or more associations for the unknown word.
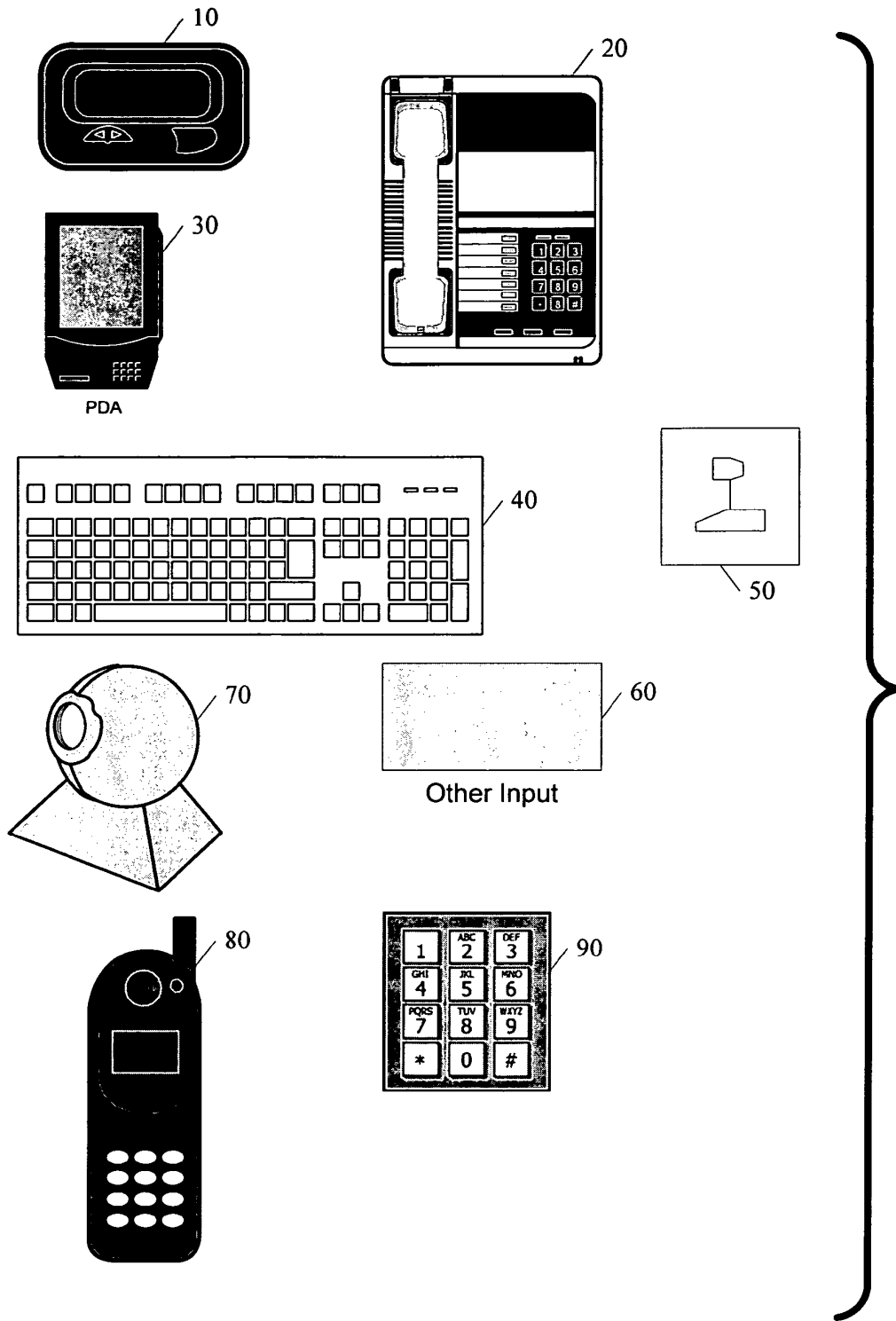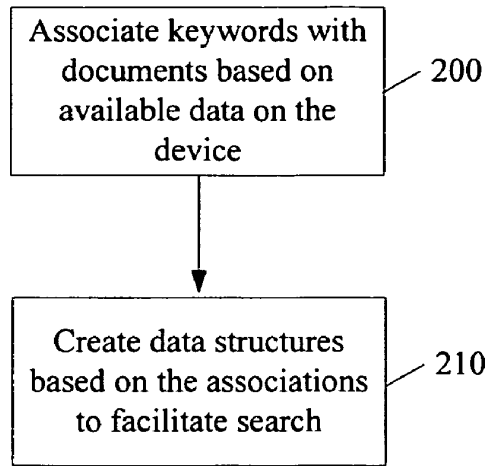
20 Claims, 7 Drawing Sheets

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20

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PDA

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60

Other Input

80

90

FIG. 1

```
┌─────────────────────────┐
│  Associate keywords with │
│    documents based on    │──── 200
│   available data on the  │
│          device          │
└─────────────────────────┘
            │
            ▼
┌─────────────────────────┐
│   Create data structures │
│ based on the associations│──── 210
│    to facilitate search  │
└─────────────────────────┘
```

FIG. 2

```
┌─────────────────────────┐
│ Accept query from the user│──── 300
└─────────────────────────┘
            │
            ▼
┌─────────────────────────┐
│    Select documents using │──── 310
│     words in user query   │
└─────────────────────────┘
            │
            ▼
┌─────────────────────────┐
│  Offer the ranked list to user│──── 320
│        for selection      │
└─────────────────────────┘
            │
            ▼
┌─────────────────────────┐
│    Get use response and   │
│   perform learning and    │──── 330
│    scoring if required     │
└─────────────────────────┘
```

FIG. 3

```
┌─────────────────────────────────┐
│  Create a list of documents on the │ ─── 400
│              device                │
└─────────────────────────────────┘
                 │
                 ▼
┌─────────────────────────────────┐
│  For each document create a list of │ ─── 410
│    unique words belonging to it     │
└─────────────────────────────────┘
                 │
                 ▼
┌─────────────────────────────────┐
│ Discard all stop words from the list │ ─── 420
│         of unique words             │
└─────────────────────────────────┘
                 │
                 ▼
┌─────────────────────────────────┐
│    Create an association of the     │ ─── 430
│   document with each remaining      │
│            keyword                  │
└─────────────────────────────────┘
                 │
                 ▼
┌─────────────────────────────────┐
│  Store the information for future use │ ─── 440
└─────────────────────────────────┘
```
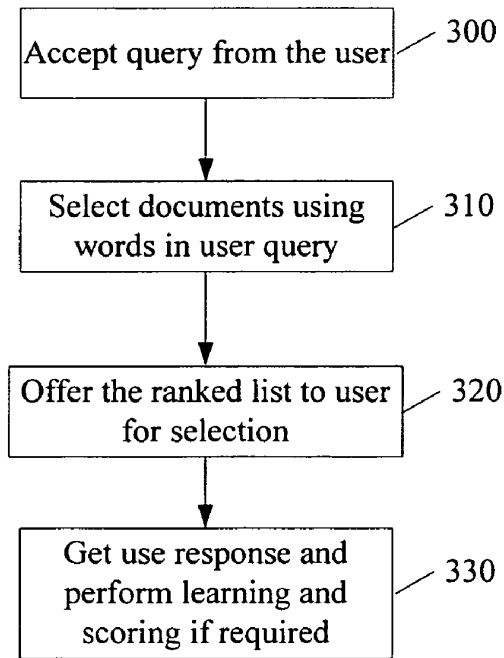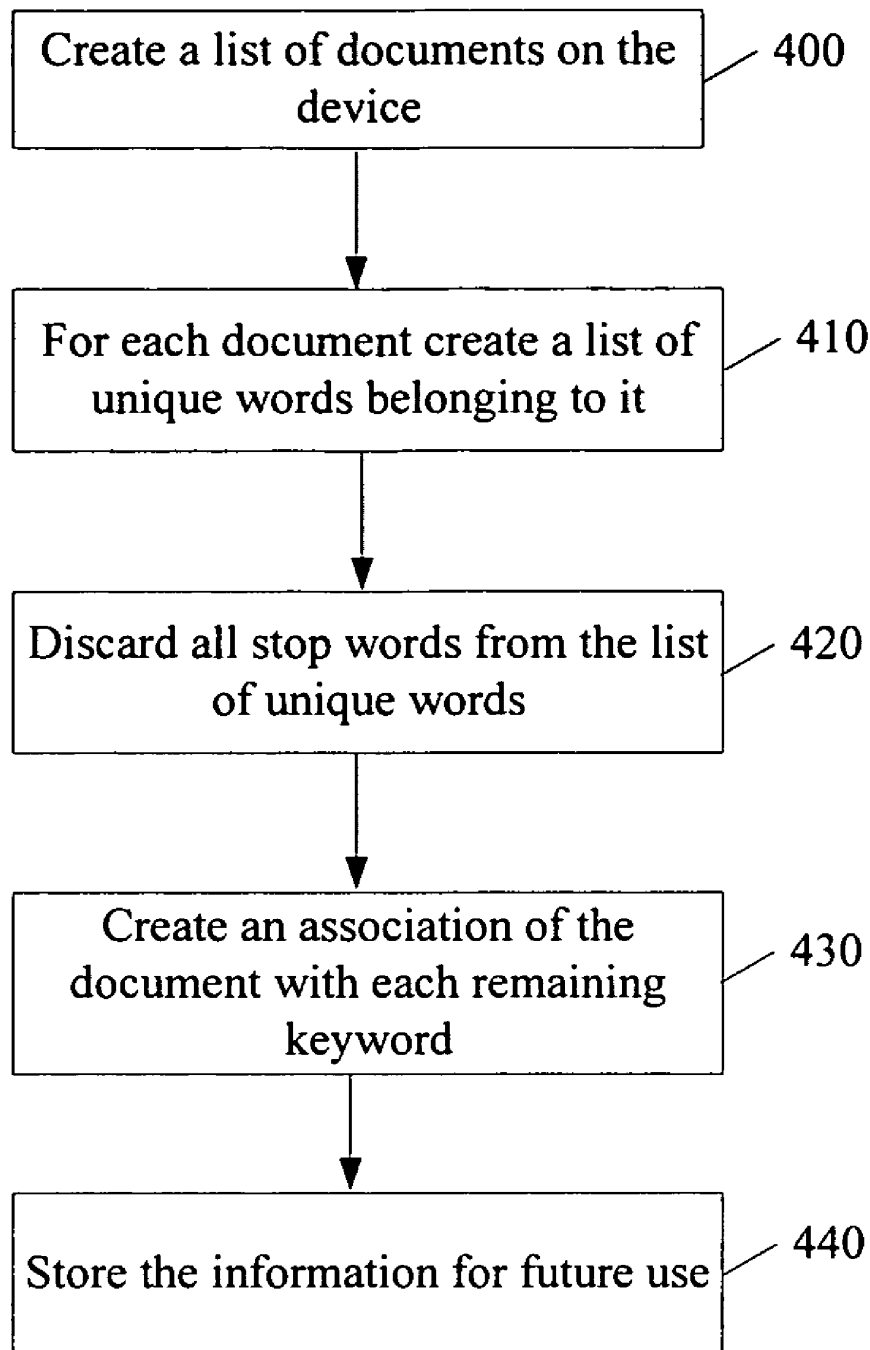
FIG. 4

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